



U.S. Department  
of Transportation

**Federal Aviation  
Administration**

# **Advisory Circular**

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**AC 21-40**

## **APPLICATION GUIDE FOR OBTAINING A SUPPLEMENTAL TYPE CERTIFICATE**

**May 6, 1998**

U.S. DEPARTMENT OF TRANSPORTATION  
Federal Aviation Administration  
Washington, DC

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**TITLE 14 OF THE CODE OF FEDERAL REGULATIONS (14 CFR) GUIDANCE MATERIAL**

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**Subject: APPLICATION GUIDE FOR  
OBTAINING A SUPPLEMENTAL  
TYPE CERTIFICATE**

**Date: 5/6/98  
Initiated by: AIR-110**

**AC No: AC 21-40  
Change:**

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**1. PURPOSE.** This Advisory Circular (AC) is intended as a certification guide and checklist for obtaining a Supplemental Type Certificate (STC). Title 14 of the Code of Federal Regulations (14 CFR) and Federal Aviation Administration (FAA) Directives (Orders and Notices) are the final authority and take precedence over this document.

**2. REFERENCES.** Title 14 of the Code of Federal Regulations (14 CFR) parts 21, 23, 25, 27, 29, 31, 33, 34, 35, 36, 39, 43, 45, 91\*, 121\*, 135\*, 183, and predecessor regulations (\* denotes partial responsibility). Also, refer to the most current version of FAA Orders 8110.4, Type Certification Process, 8100.5, Aircraft Certification Directorate Procedures, 8300.10, Airworthiness Inspector's Handbook, and various ACs and Orders.

**3. BACKGROUND.** This AC describes procedures for typical modification projects. Unusual or complex projects may require deviations from these procedures. Early and frequent coordination with the FAA is critical on all projects.

**4. REQUEST FOR INFORMATION.** If there are questions, or more information is desired about this AC, write or call FAA; Certification Procedures Branch, AIR-110; 800 Independence Avenue, SW; Washington, DC 20591; (202) 276-9588.

Abbas A. Rizvi  
Acting Manager, Aircraft Engineering  
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## CHAPTER 1. INTRODUCTION

### 1-1. GENERAL.

**a. The two objectives of Aircraft certification** is to encourage and foster the development of civil aviation, and to ensure aviation safety. One method used by the Federal Aviation Administration (FAA) to fulfill these objectives is the aircraft certification system through which aircraft design and modification must be approved. Title 14 of the Code of Federal Regulations (14 CFR) and the Civil Air Regulations (CAR) define the minimum required safety standards for FAA certification. By demonstrating compliance with these regulations, an aircraft modifier may obtain the necessary FAA approval for a modification.

**b. Types of aircraft certification design approvals** are determined by the magnitude and complexity of the change. Aircraft modifications can be subdivided into minor and major changes (14 CFR part 21, section 21.93). Minor changes are those which do not appreciably affect weight, balance, structural strength, reliability, operational characteristics, airworthiness characteristics, power and noise characteristics, or emissions. Minor changes may be approved under a method acceptable to the Administrator before submitting to the Administrator any substantiating or descriptive data (14 CFR part 21, section 21.95). Major changes are those which are not minor. The type of FAA approval is applicable to a given modification. Supplemental Type Certificates (STC) are required for most major changes to existing Type Certificate (TC) products affected by a modification or installation when the change is not so intensive as to require a new TC (14 CFR part 21, section 21.19). STC's are not issued for minor changes or for approval of replacement and modification parts meeting the provisions of 14 CFR part 21, section 21.303. More than one STC may be necessary for a given modification. One STC may be required to approve the change to an engine or propeller, while a second STC may be necessary to approve the aircraft installation of the modified engine or propeller. An STC will probably be required if a significant amount of analysis or flight tests are required, or if extensive flight manual changes are necessary. An STC is issued through the FAA ACO or Engine Certification Office (ECO) which serves the geographic area of residence of the STC

owner. Significant STC applications will require coordination with the Directorate, and may involve more time to process the application. See Order 8100-5.

NOTE: If there are any questions whether the modification is major or minor, the applicant should contact the ACO.

### 1-2. SUPPLEMENTAL TYPE CERTIFICATES.

**a. Privileges** are associated with the issuance of an STC.

(1) Standard Airworthiness Certificates may be granted to specified aircraft that are modified in accordance with the STC.

(2) Multiple installations may be achieved on any certificated aircraft designated in accordance with the STC.

(3) Parts Manufacturer Approval (PMA) may be obtained by the STC holder to manufacture and sell parts/kits when it is demonstrated to the FAA Manufacturing Aviation Safety Inspector that the applicant has established a Fabrication Inspection System which meets the requirements of 21.303(h) to ensure that production is consistent to adequately duplicate the parts.

NOTE: The STC must be a "Multiple" Installation STC.

**b. Responsibilities** of the STC holder are the accomplishments of the modification or installation in accordance with the STC, and reporting to the FAA any failures, malfunctions, or defects per 14 CFR part 21, section 21.3. The holder of an STC, is also required to maintain an updated data file related to the STC.

**c. Types of STC's** are classified as either "one-only" STC (aircraft/engine/propeller) or "multiple" STC (aircraft/engine/propeller).

(1) "One-only" STC's apply to only one aircraft/engine/propeller serial number.

(2) "Multiple" STC's are necessary if two or more aircraft/engines/propellers are to be modified, and it must be demonstrated that the modification can be duplicated.

**d. AC 21-5M, Announcement of Availability: Summary of STC's**, is an FAA publication listing all existing MULTIPLE STC's for each aircraft model. A copy of this publication is available for review at the local FAA ACO, FSDO, and MIDO and a disk (updated once a year) may be purchased from the National Technical Information Service (NTIS). This publication may be reviewed to determine if another STC has been issued that would satisfy the intended requirement, and thereby prevent a duplication of effort.

NOTE: Pursuant to 49 U.S.C 44704; If the holder of an STC agrees to permit another person to use the certificate to modify an aircraft, aircraft engine, propeller, or appliance, the holder will provide the other person with written evidence, in a form acceptable to the administrator, of that agreement. A person may change an aircraft, aircraft engine, propeller, or appliance based on an existing STC only if the person requesting the change is the holder of the STC or has permission from the holder to make the change. See chapter 9.

**e. No STC activity is covered** under our bilateral airworthiness agreements in any country except Canada. Additional guidance should be sought from AIR head quarters before proceeding on any STC project involving a foreign entity to any degree.

**f. 14 CFR part 21, sections 21.137 and 21.601** require the FAA to make a determination that there will be no undue burden on the United States in administering the applicable requirements of Title 49, U.S. Code (Transportation), and Title 14 of the Code of Federal Regulations when production approvals are requested at manufacturing facilities located outside the United States. Once the foregoing criteria have been satisfied by the certificate management Directorate and the PC holder, the FAA office responsible for certificate management of the PC holder should prepare a decision paper.

NOTE: The decision paper should be signed by the Aircraft Certification Directorate Manager who has certificate management responsibility for the PC holder prior to forwarding the decision paper to AIR-200 for concurrence and to AIR-1 for approval. See AC 21-24..

### 1-3. KEY ASPECTS OF THE STC APPLICATION PROCESS.

**a. The applicant's responsibility** for substantiating the modification is accomplished by showing the FAA that the modified aircraft/engine/propeller complies with the applicable regulations.

**b. FAA Form 8110-12**, Application For Type Certificate, Production Certificate, or Supplemental Type Certificate, should be submitted to the geographically responsible ACO. See appendix 8. The most current version of AC 20-126, Aircraft Certification Service Field Office Listing, contains an address, telephone number, and geographic area listing of all ACOs.

**c. Certification requirements** are located in title 14 CFR's, or the predecessor to them, Civil Air Regulations. These regulations are extensive but only certain portions apply to a particular STC. See chapter 3.

**d. Design feasibility** should be discussed with a local FAA engineer to determine if the proposed modification design is feasible for approval BEFORE MODIFYING THE AIRCRAFT. An unapproved modified aircraft may be subject to grounding and Airworthiness Certificate removal.

**e. Data submittals** are to contain sufficient descriptive and substantiating/compliance data to completely describe the design of the modification or installation, and demonstrate that the design meets the applicable regulations. See chapter 5.

**f. Inspections** are for conformity and compliance. The conformity inspection verifies that the modification conforms to the descriptive data, while the compliance inspection verifies that the modification meets the applicable regulations. See chapter 6.

**g. Tests** may include verifying the component, ground requirements, and flight requirements. Component or certification testing demonstrates that detail parts, components, or subassemblies function as required to meet the applicable regulations. Ground testing and flight testing are performed to demonstrate the completed modification or installation complies with the regulations. See chapter 8.

**h. Timing/scheduling** necessary for obtaining FAA approval varies with the complexity of each modification. Inspections, meetings, tests, etc., should be planned, scheduled, and provided well in advance to the FAA to assure appropriate personnel are available. Scheduling flight tests has the added complication of weather. All proposed changes to the schedule should be kept to a

minimum and provided to the FAA immediately for concurrence.

**i. Use of designees** authorized by the FAA to approve data, conduct inspections, witness tests, etc., may expedite the approval of a modification. See chapter 4.

**j. Issuance of an STC** is the final product and goal of the application process. See chapter 2 and chapter 9.

**k. Subsequent change procedures** to the original substantiating data should be submitted for approval and inclusion in the FAA data files. Major changes must be FAA approved prior to inclusion in the design data. Minor changes may be accomplished in any manner found acceptable to the FAA. See 14 CFR part 21, sections 21.95 and 21.97.



## CHAPTER 2. THE STC PROCESS

### 2-1. GENERAL.

The STC application process has four basic steps: (1) FAA evaluation of submitted application and data; (2) inspection and test of detail parts, components, and subassemblies; (3) inspection and tests of the complete assembly, modification and installation; and (4) issuance of the STC. Described in the following text is the STC process for an aircraft. The process would be similar for an engine or propeller.

### 2-2. SUBMITTAL AND EVALUATION OF APPLICATION AND DATA.

a. **FAA Form 8110-12**, Application for Type Certificate, Production Certificate, or Supplemental Type Certificate, should be submitted to the FAA ACO with a letter that includes:

- (1) A description of the project.
- (2) The type of aircraft involved.
- (3) A schedule for completion of the project.
- (4) Where the work (design and installation) will be conducted.
- (5) A letter from the applicant authorizing use of specific agents to represent the applicant. Certain individuals may act on behalf of the FAA. See chapter 4.
- (6) Statement, if necessary, that a project initiation meeting is needed or desired.

b. **Applicant should submit a Certification Plan** to the FAA for approval, (see figure 2-4) containing:

NOTE: Implementation of the certification plan will be at the discretion of the ACO Manager/Project Engineer. An implemented plan should also be revised throughout the program.

- (1) "General Information" should identify: the applicant, application date, model

designation, etc.; the certification basis of applicable 14 CFR parts (including sections), exemptions, and special conditions; how compliance will be shown (tests, analysis, similarity, etc.), and what will be submitted to show compliance. See Figure 2-5.

NOTE: Identification of applicable regulations may require assistance from the FAA Project Engineer.

- (2) "Project Schedule" identifying dates of: major milestones; when data and test plan submittals will be made; when conformity inspections, installation, and testing are required; and when the project will be completed.

(3) "Identification of Designated Manufacturing Inspection Representatives (DMIR), Designated Airworthiness Representatives (DAR), and Designated Engineering Representatives (DER)," and their specialties, utilized; including who will sign FAA Form 8110-3, Statement Of Compliance With The Federal Aviation Regulations, (if required), and whether it will be recommended or approved. Include names, points of contact, FAA home office and level of authority.

c. **FAA will establish a project** and assign a project manager/engineer. Within 10 working days after receipt of the application and certification plan, an acknowledgment letter is transmitted to the applicant identifying the project number, project manager/engineer and team (i.e. engineer(s), flight test personnel, Aircraft Evaluation Group (AEG), MDO personnel, project officer, etc.), and the date of the project initiation meeting as appropriate.

d. **FAA will review the "Certification Plan"** and provide concurrence with, or modification of the Certification Plan, to meet or accomplish the applicable regulations and advisory material, certification procedures (i.e., DER data approval, test witnessing, etc.), and analysis, documentation and testing required to satisfy certification requirements.

NOTE: For systems that contain software, the Plan for Software Aspects of the Certification (PSAC) should be submitted

after FAA approval of the Product Certification Plan. (Reference RTCA DO-178 latest change.)

**e. Applicant should submit all data** to the FAA project manager/engineer for review and approval. If the data is modified or updated during the course of the project, the applicant should immediately contact the FAA and establish a time frame when the change(s) will be submitted to the FAA.

NOTE: In many cases the FAA may need more than one copy of the data submittal package.

(1) Test plans need prior approval by the ACO and should include all necessary details: test fixture, test articles, (parts, components, or subassemblies) as well as the final modification or installation tests.

NOTE: Components and/or assemblies requiring conformity should be identified, including the test fixture and equipment.

(2) FAA coordination of the work will only be with the applicant/agent identified on FAA Form 8110-12, unless otherwise indicated in a specific authorization.

NOTE: The applicant is responsible for coordinating any FAA requests with the applicant's vendors and subcontractors.

**f. FAA will review the data** for compliance with the applicable regulations, and the project manager/engineer will notify the applicant when data is accepted.

### 2-3. INSPECTION AND TESTING OF COMPONENTS AND SUBASSEMBLIES.

Prior to modification or installation completion, it may be necessary to inspect and/or test detail parts, components, and/or subassemblies to verify the descriptive data conforms and complies with the applicable regulations. This is especially true when the part(s) will be out of sight after installation. See chapters 6 and 8.

**a. FAA will issue requests for conformity,** FAA Form 8120-10, for individual articles (i.e.

detail parts, components, subassemblies, test articles, etc.) as necessary.

NOTE: The conformity inspection request should only be issued after the data has been FAA or DER approved.

**b. Applicant should submit FAA Form 8130-9, Statement of Conformity,** after performing own conformity inspections and complying with 14 CFR part 21, section 21.33. The applicant should, at the same time, arrange (with FAA concurrence) for FAA or FAA designee for conformity inspection, and FAA/DER witnessing of all certification testing to approved test plans.

NOTE: Submission of this form is called out on the Type Inspection Authorization. The FAA MIDO may delegate performance of the conformity inspection to an FAA DAR/DMIR.

**c. FAA and Applicant conduct inspections and tests.** The FAA, or their designee, will conduct all necessary conformity inspections. Upon completion of conformity inspection, the applicant will perform all required tests per approved test proposal. The FAA project engineer or an FAA authorized DER should witness all tests and conduct any necessary compliance inspections.

**d. Applicant should submit test reports and substantiating data** for all certification testing, as well as any further data necessary to demonstrate compliance with the regulations.

**e. FAA will evaluate test reports and substantiating data** for compliance with the applicable regulations. When it is determined that these reports and data comply, approval of the submittals will be granted.

### 2-4. INSPECTION AND TESTING OF COMPLETE ASSEMBLY AND INSTALLATION.

When the modification or installation is complete and all data has been approved, all component inspections and tests should be performed on the final article. These inspections and tests will be called out in the Type Inspection Authorization (TIA), FAA Form 8110-1, and must be completed satisfactorily before the STC can be issued.

NOTE: In the event that a TIA is not required, a request for installation conformity on FAA Form 8120-10 will be issued by the FAA project manager/engineer.

**a. Applicant should submit proposed Aircraft/Rotorcraft Flight Manual Supplement (AFMS/RFMS) and flight test proposal** to the FAA for evaluation by the FAA pilot.

**b. Applicant should conduct own certification test** when the proposed test plan is acceptable to the FAA.

NOTE: The aircraft should be placed in research and development. See 14 CFR part 21, section 21.191.

**c. Applicant should complete his/her own certification flight test requirements** prior to any direct FAA flight test involvement, to assure the design change complies with all application regulations.

**d. Applicant should submit a flight test report** to the FAA for review after successful completion of his/her own certification flight testing.

**e. Applicant should submit FAA Form 8130-9** and arrange (with FAA concurrence) for FAA installation conformity inspection to be conducted.

**f. FAA will evaluate the applicant's flight test report** for compliance with 14 CFR part 21, section 21.35(a)(4) and other applicable regulations. Upon acceptance, FAA certification testing, as called out in the TIA, may begin.

**g. FAA will prepare and issue the TIA** after coordination is accomplished with each appropriate engineering discipline, MIDO representative, and if applicable, AEG personnel, and the examination of the technical data required for the STC is completed or has reached a point where the aircraft will meet the applicable regulations.

**h. All conformity installation inspections** necessary are conducted by the FAA (or authorized FAA designee) as called out in the TIA or Request

for Conformity (installation). Satisfactory completion of the inspections is necessary for TIA testing to begin. Conformity Inspections are recorded on Conformity Inspection Record, FAA Form 8100-1.

**i. Applicant should arrange** (with FAA concurrence) for final FAA compliance inspections and TIA ground and flight testing, as applicable.

**j. Final compliance inspections and testing**, (ground and flight), are conducted by the FAA/Applicant as called out in the TIA.

NOTE: The aircraft should be placed in showing compliance with regulations. See 14 CFR part 21, section 21.191.

**k. Applicant should submit all final data** upon completion of the FAA final compliance inspections and testing, to the FAA project manager/engineer for review and approval. Data such as AFMS/RFMS, test reports, life limited parts (14 CFR parts 23, 25, 27, etc.).

**l. FAA will evaluate final data** submittal for compliance with the regulations. When it is determined that the data demonstrates compliance with the regulations, final FAA approval of the modification or installation will be granted.

## 2-5. ISSUANCE OF THE STC.

When all data, TIA tests, and inspections have been completed satisfactorily and approved by the FAA, an STC will be issued to the applicant. All appropriate project data will be sent to the FAA archives, and the project will be closed.

**a. FAA, FAA designee, or applicant will prepare the Supplemental Type Inspection Report (STIR)**, compiling results of the completed TIA inspections, tests, and evaluations.

NOTE: If an FAA designee, or applicant prepares the STIR, the FAA must still review and approve the report.

**b. FAA will prepare an STC** upon completion of all the previous steps found in chapter 2, sections 2-2, 2-3, and 2-4. The STC will be signed by the ACO manager.

NOTE: In many cases, the applicant may be informally notified of the final approval and STC number when the STC is officially signed by the ACO manager.

**c. FAA will issue the STC**, (FAA Form 8110-2), to the applicant with a transmittal letter.

**d. FAA will send a copy of** all FAA supplemental type certificates, FAA Form 8110-2, which the holders have indicated are available for use by others, to be logged into the FAA STC data base: FAA; Attn.: AFS-610; P.O. Box 25082; Oklahoma City, OK 73125.

**e. Application project will be closed** when all steps in this chapter have been completed successfully.

## **FIGURE 2-1. STC APPLICATION PROCESS CHECKLIST**

### **Phase I. SUBMITTAL AND FAA EVALUATION OF APPLICATION AND DATA (Paragraph 2-2, Figure 2-2)**

- Applicant submits application
- Applicant submits Certification Plan (as required by FAA)
- FAA establishes project
- FAA reviews and approves Certification Plan
- Applicant submits data
- FAA reviews data

### **Phase II. INSPECTION AND TESTING OF COMPONENTS AND SUBASSEMBLIES (Paragraph 2-3, Figure2-2)**

- FAA issues individual requests for conformity inspection
- Applicant makes arrangement for inspections and tests
- FAA conducts/delegates conformity inspections
- Applicant conducts/FAA witnesses certification tests
- Applicant submits test reports and substantiating data
- FAA evaluates test reports and substantiating data

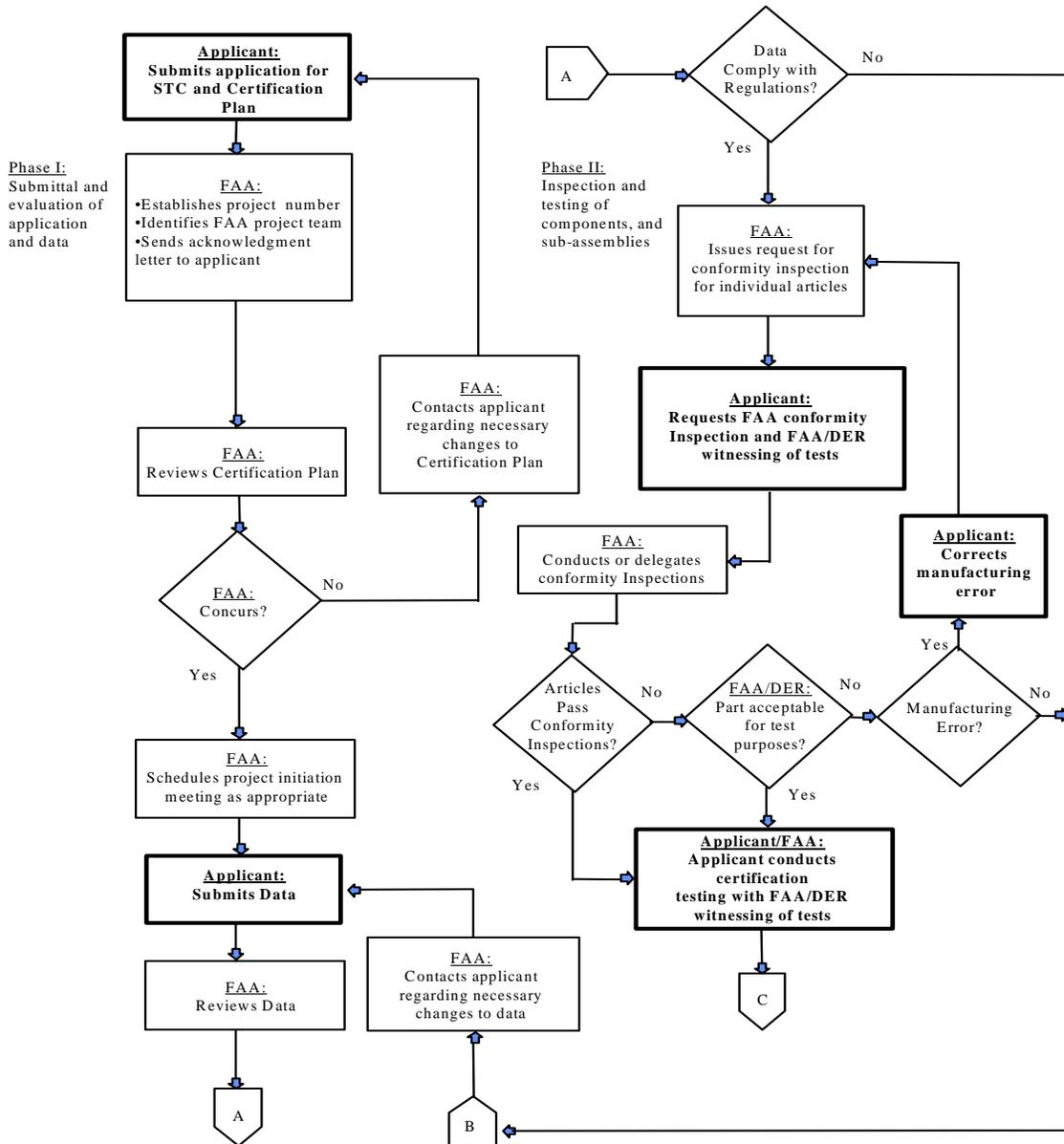
### **Phase III. INSPECTION AND TESTING OF COMPLETE ASSEMBLY AND INSTALLATION (Paragraph 2-4, Figure 2-2)**

- Applicant submits proposed AFMS/RFMS and flight test proposal
- FAA evaluates proposed AFMS/RFMS and flight test proposal
- FAA prepares TIA/request for Conformity (installation)
- Applicant makes arrangements for installation conformity inspection
- FAA conducts installation conformity inspection
- Applicant completes company development flight tests
- Applicant submits flight test report
- FAA evaluates flight test report
- Applicant makes arrangements for final inspections and tests
- FAA/applicant conduct final inspections and tests per the TIA
- Applicant submits all final data
- FAA evaluates final data

### **Phase IV. ISSUANCE OF THE STC (Paragraph 2-5, Figure 2-2)**

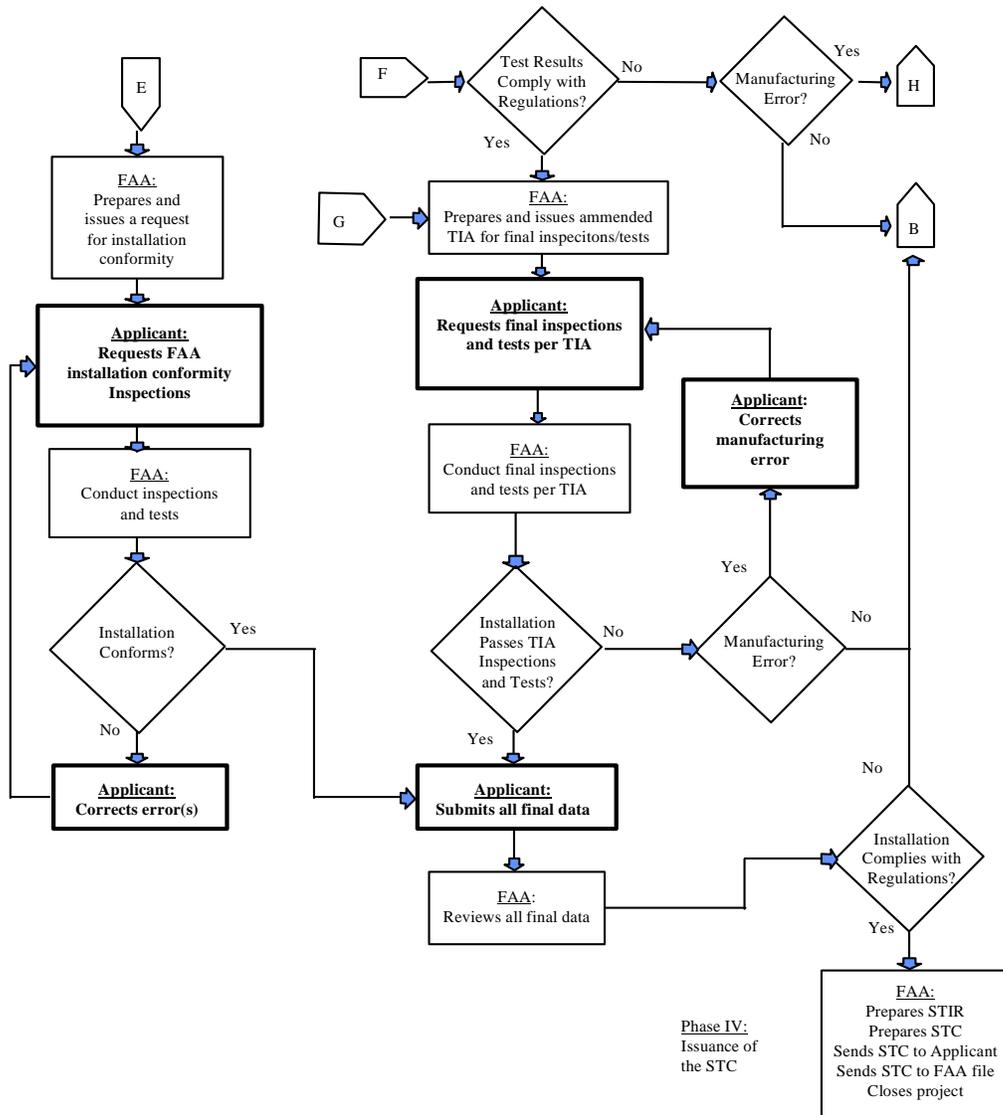
- FAA prepares STIR
- FAA prepares STC
- STC sent to applicant
- FAA finalizes STIR
- STC sent to FAA archives
- Project closed

**FIGURE 2-2. FLOWCHART OF THE STC APPLICATION PROCESS**





**FIGURE 2-2. FLOWCHART OF THE STC APPLICATION PROCESS (Cont'd)**



### FIGURE 2-3. STC APPLICANT/FAA PROJECT INITIATION CHECKLIST

The purpose for this checklist is to clearly communicate early in the certification process the requirements that must be fulfilled for an STC to be issued. The contents of this checklist should be communicated between the applicant, the project manager/engineer, and the responsible MIDO office of the project at a minimum.

1. Is the application complete?
2. Is there anticipation of expanding the model applicability of the STC? If so, is there anything that can be done on the initial certification that will make expansion of the STC easier at a later date?
3. Is the STC going to be “multiple” or will it be a “one only”? If the STC is a “One-only”, the aircraft make, model, and serial number should be provided.
4. Will the kits be for sale? If so, installation instructions will be necessary so that anyone obtaining a kit will have enough information for installation. (14 CFR part 21, section 21.303.) What is the fabrication inspection system?
5. Is there a requirement for generating instructions for continued airworthiness? See chapter 5-3.i. and note.
6. Is there an existing STC that could be used instead of going to the trouble of applying for a new one?
7. What is the Applicant’s/FAA’s schedule?
8. Where will modification of the aircraft take place?
9. Will any parts be fabricated outside of the applicant’s facility? If so, what kind, where, and when will they be made? Qualification and conformity will be required.
10. What is required for the conformity inspection process? The applicant has the responsibility to properly record and report their conformity inspection on FAA Form 8100-1, Conformity Inspection Record, prior to FAA’s conformity inspection. It is a necessity for early submittal of FAA Form 8130-9, in-process conformities and the procedure for making the request for conformity, FAA Form 8120-10. Drawings must be FAA/DER approved prior to asking for conformity inspection. See 14 CFR part 21, section 21.33.
11. What kind of drawing system will be used? The drawing system used should: contain a drawing list; provide information required for the various types of drawings (i.e. detail, component, assembly, and installation); describe the modification; list the materials and applicable specifications, processes such as heat treat, etc., and protective coatings used; and provide the dimensions in enough detail to accomplish the modification. Any

**FIGURE 2-3. STC APPLICANT/FAA PROJECT INITIATION CHECKLIST  
(Cont'd)**

- process specifications, (fiberglass work etc.), used should be documented and reviewed by the FAA. New processes may have to be demonstrated to an FAA inspector. Suppliers of materials should be listed.
12. Will designees be used on the program? Identify the name, number and type of designees to be used. Explain the purpose of utilizing designees.
  13. What types of tests are anticipated? What constitutes test proposals, conformities for setups and witnessing of tests, applicant versus FAA tests, and (if applicable) placing the aircraft in experimental category.
  14. Will special instructions be necessary to tell the pilot how the modified aircraft will now operate? If so, an AFMS/RFMS will need to be prepared.
  15. It is the applicant's responsibility to establish a certification test plan and compliance check list, and to determine the modification meets all applicable airworthiness standards.
  16. Is the project significant? See FAA Order 8100.5, Aircraft Certification Directorate Procedures. Are issue papers, technical meetings required? What is the certification basis for the modification. Is AEG involvement required? Any special conditions? (e.g., High Intensity Radiated Fields (HIRF)).
  17. What data must be submitted prior to issuance of, and how is the TIA and STIR used.
  18. What guidance material is available? (i.e., guides, ACs, Orders, Notices, handouts, etc.)
  19. What can be done to the aircraft while in modification/conformity process?
  20. What is the potential for the alteration impacting 14 CFR part 36 noise requirements and the expense involved to show compliance with noise requirements?
  21. Is a document list, with revision levels and approval dates, consisting of safety analysis, test plans, test reports and software documents, etc., submitted?

**FIGURE 2-4. SAMPLE CERTIFICATION PLAN**  
(Paragraph 2-2.b.)

- I. Introduction
- II. System Description
- III. Certification Requirements
  - 14 CFR part/CAR (etc.)
  - System special requirements, unique or novel aspects
  - Compliance checklist
- IV. Method of Compliance
  - Analyses – failure, safety, performance, etc.
  - Tests – qualification, flammability, laboratory, simulator, ground, flight, etc.
  - Software compliance
  - Design
- V. Functional Hazard Assessment Summary
  - System criticality
  - Software criticality
  - Functional failure conditions summary
- VI. Operational Considerations (if required)
  - MMEL - Master Minimum Equipment List
  - FCOM - Flight Crew Operating Manual
- VII. Certification Documentation
- VIII. Certification Schedule
  - Descriptive data submittal
  - Substantiating data submittal
  - Test schedule, including TIA
  - Conformity inspection schedule
  - Compliance inspection schedule
  - Final approval
- IX. Use of Designees and Identification of Individual DER/DAR



## CHAPTER 3. APPLICABLE REGULATIONS

### 3-1. GENERAL.

Each Type Certificated U.S. aircraft, engine, or propeller design complies with the rules and regulations defined in the 14 CFR's and CAR's. Since not all specific rules and/or regulations will apply to a modification and/or installation, a decision should be made as to which are applicable, with an issue paper possibly used to document and justify a given position.

### 3-2. CERTIFICATION BASIS.

Each TC product is associated with a list of the regulations, (either 14 CFR's or CAR's), with which compliance must be shown.

**a. The TC certification basis** is specified by the applicable regulations located in the respective aircraft, engine, or propeller specifications, or TC data sheets. Copies of these data sheets may be viewed at the local FAA ACO, FSDO, and MIDO. See the latest version of AC 20-126, Aircraft Certification Service Field Office Listing, for locations.

**b. The certification basis for the STC** (modification) includes certification basis of the model being changed plus those requirements effective on the date of the application and are generally related to the components or areas affected by the change.

NOTE: A "top-down" approach may be needed to determine the certification basis for all changes to the TC for a significant STC project. See Order 8110.4, paragraph 14.

### 3-3. AVAILABILITY OF REGULATIONS.

Current regulations are available from the Superintendent of Documents; U.S. Government Printing Office; Washington, DC 20402. They may also be located on FedWorld (<http://www.fedworld.gov/>). Earlier regulations may be available in libraries or in the Federal Register.

NOTE: AC-43 series contain guidance and general information for maintenance, repair, and alteration requirements.

**FIGURE 3-1. REGULATIONS MOST COMMONLY USED FOR STC APPLICATIONS**

<u>Regulation</u>	<u>Subject</u>
14 CFR part 21	Certification
14 CFR part 23 or CAR 3	Airworthiness Standards: Small Airplanes
CAR 4a	Airworthiness Standards: Older Model Airplanes (See S.R. 407 for DC-3 and Lockheed 18)
14 CFR part 25 or CAR 4b or CAR 4a-T	Airworthiness Standards: Transport Category Airplanes (See S.R. 422 for turbine aircraft certificated under CAR 4b)
14 CFR part 27 or CAR 6	Airworthiness Standards: Normal Category Rotorcraft
14 CFR part 29 or CAR 7 or CAR 7a	Airworthiness Standards: Transport Category Rotorcraft
CAR 8	Restricted Category
14 CFR part 31	Airworthiness Standards: Manned Free Balloons
14 CFR part 33 or CAR 13	Airworthiness Standards: Aircraft Engines
14 CFR part 34	Fuel Venting and Exhaust Emission Requirements for Turbine Engine Powered Airplanes
14 CFR part 35 or CAR 14	Airworthiness Standards: Propellers
14 CFR part 36	Noise Standard: Aircraft Type and Airworthiness Certification
14 CFR part 39	Airworthiness Directives
14 CFR part 43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration
14 CFR part 45	Identification and Registration Marking
14 CFR part 47	Aircraft Registration

**FIGURE 3-1. REGULATIONS MOST COMMONLY USED FOR STC  
APPLICATIONS  
(Cont'd)**

<u>Regulation</u>	<u>Subject</u>
14 CFR part 91	General Operating And Flight Rules (partial responsibility)
14 CFR part 121	Operating Requirements: Domestic, Flag, and Supplemental Operations (partial responsibility)
14 CFR part 135	Operating Requirements: Commuter and On-Demand Operations (partial Responsibility)



## CHAPTER 4. USE OF DESIGNEES

### 4-1. GENERAL.

**a. Purpose of the designee system** is to provide FAA authorized assistance by designating private persons to act as representatives of the Administrator for the purpose of issuing certificates. (Reference 14 CFR part 183, Representatives of the Administrator.) This may include examining, inspecting, and testing of persons, aircraft, engines, or propellers, and approving or recommending approval of certain types of data, etc., for compliance with the 14 CFR's or CAR's.

**b. The Applicant may hire** an FAA authorized designee to perform a task an FAA employee would normally perform.

**c. Types of designees most often used** in the STC application process are DER's, DMIR's, and DAR's.

**d. Designees are not employees of the FAA.** As private individuals, acting as representatives of the Administrator, they set their own rates and run their own businesses.

### 4-2. DESIGNATED ENGINEERING REPRESENTATIVES.

**a. DER's may only** approve, or recommend approval, of data as complying with the 14 CFR or CAR to the FAA. A DER's authority is limited to specific functions within one or more of the following categories:

- (1) Structural.
- (2) Powerplant (installation, engine or propeller).
- (3) Systems and Equipment (mechanical or electrical).
- (4) Radio.
- (5) Engines.
- (6) Propellers.

(7) Flight (flight analyst or flight test pilot).

(8) Acoustical.

(9) Administrative/Management.

**b. DER Appointment** may be granted when the FAA has been satisfied that the DER applicant demonstrated the ability to research applicable regulations, procedures, policies, and methods of compliance; and produced work acceptable to the Administrator. See the most current version of FAA 8110.37, Designated Engineering Representatives (DER) Guidance Handbook.

NOTE: It is the applicant's responsibility to assure all potential DERs to be utilized on a project have the correct delegated authority applicable to that project.

**c. FAA auditing of the DER's work** is required on a continuing basis. Problems discovered during these audits are referred back to the DER for correction. Generally, this interchange takes place directly between the DER and the FAA. However, when the DER's work is submitted by a third party, the FAA will refer the items needing corrections to that party.

NOTE: Project scheduling should allow for the required FAA audits of DER submittals.

**d. The DER performs all tests** on which the DER intends to approve or recommend approval of the data. When a DER approves test data, the DER is indicating: the DER performed the tests; the tests were conducted in accordance with the approved test plan; and the recorded data is the official test results. Flight test programs approved to be conducted by a DER require the issuance of a TIA and specific authorization from the ACO Flight Test Branch to conduct tests. See FAA Order 8110.37.

NOTE: All FAA flight test programs require a TIA whether it is conducted by an FAA or DER pilot. See FAA Order 8110.4.

**e. Administrative DER** acts as a focal point for FAA coordination activity. This includes: correspondence; scheduling meetings; organizing technical DER activities; coordinating FAA participation in official tests; and conformity inspections. If appointed coordinator or checkpoint for other DER work, the Administrative DER should be assigned the authorized area of “Special-Administrative” with the delegated function of “DER Coordination.”

**f. Management DER** performs certification management duties for the FAA similar to that of the FAA Project Engineer. This includes organizing the certification program; and directing, overseeing, and managing technical assessments and findings of compliance. The Management DER assures all technical data required to show compliance (except in those areas reserved by the FAA) is reviewed and approved.

**g. A DER may be authorized** to act as a DER (to find compliance only with U.S. requirements) in a country other than the U.S. under the conditions and limitations specified in the latest revision of FAA Order 8110.37, DER Guidance Handbook.

#### **4-3. DESIGNATED MANUFACTURING INSPECTION REPRESENTATIVES.**

DMIR’s, within limits prescribed by 14 CFR part 183, section 183.31, and under the general supervision of the FAA, may:

**a. Issue an original standard or special airworthiness certificate** when determined that the product(s) conform to the approved design requirements and are in a condition for safe operation.

**b. Issue an experimental certificate** for the purpose of showing compliance with 14 CFR chapters I and III for aircraft which the Production Approval Holder (PAH) holds the TC and has undergone changes to the type design that require an FAA official flight test.

**c. Conduct conformity inspections** to determine:

(1) Prototype products and related parts conform to design specifications

(2) Production products and related parts conform to the approved type design and are in a condition for safe operation.

#### **4-4. DESIGNATED AIRWORTHINESS REPRESENTATIVES.**

**a. DAR’s may perform** examinations, inspections, and testing services necessary to issue certificates when approved by the FAA.

**b. Manufacturing DAR’s may be utilized** for conformity inspections and issuance of experimental and standard airworthiness certificates. However, they must be delegated by the appropriate MIDO and FSDO prior to performing an authorized function.

#### **4-5. LIST OF DESIGNEES.**

The FAA maintains a list of consultant DER’s and DAR’s in the most current version of AC 183.29-1, Designated Engineering Representatives, and AC 183-35, FAA DAR, DAS, DOA, and SFAR Part 36 Directory. All ACO’s, MIDO’s, and FSDO’s should have a list of designees for their particular geographic area.

#### **4-6. RESPONSIBILITIES OF THE APPLICANT.**

The applicant is responsible for contacting the local ACO, MIDO, and FSDO to assure that the designee has the authorization of the FAA to perform a particular function (i.e. approve data, perform inspections, witness tests, etc.), for the given modification. The applicant is also responsible to coordinate with the FAA to assure each test and inspection authorization has been delegated.

## CHAPTER 5. DATA

### SECTION 1. REQUIRED DATA

#### 5-1. GENERAL.

**a. Data** submitted to the FAA should demonstrate that the modification to a TC aircraft, engine, or propeller complies with the appropriate regulations. This data should be obtained, organized, and submitted by the applicant or the applicant's representative to the FAA for review and approval.

**b. Required design data** can be divided into two major categories: descriptive, and compliance or substantiation data. Descriptive data defines the design of the modification, while compliance data substantiates that the design meets the applicable regulations.

**c. A copy of all data** will remain on file with the FAA. However, this data is treated as the applicant's property and cannot be released outside the FAA without the applicant's consent.

**d. All data submitted must be identified.** This includes title, drawing or report number, revision level, date, and applicant's name. Each page of a report should contain enough of this information for complete identification. The FAA project number should also be identified.

**e. Descriptive data requirements** (for "one-only" versus "multiple" STC's) are different. However, the SAME LEVEL OF SAFETY IS REQUIRED for either application.

**f. Data to be submitted** to the FAA should have the following tasks accomplished in accordance with 14 CFR part 21, section 21.21 and 21.33(b) before submittal:

(1) All descriptive and substantiation data is checked for completeness and correctness of information.

(2) The design data and the modified aircraft complies with the applicable regulations; (FAA verifies this finding.)

(3) The descriptive data conforms with the actual configuration of the modification, and all stress analyses, test proposals, and test results are based on the descriptive data.

(4) The data describing and substantiating the modification is properly identified, presented in an orderly fashion, and clearly states the manner in which it contributes to the findings of compliance.

#### 5-2. DESCRIPTIVE DATA.

**a. In general,** descriptive data should completely define, or describe, a given design. It may include drawings, sketches, marked photographs, process specifications, etc. The data will be verified by the FAA for compliance with the applicable airworthiness regulations.

**b. A "one-only" STC descriptive data package** is applicable to only one installation/modification. The package may consist of marked-up photographs, sketches, written descriptions, marked-up excerpts from manufacturers' parts catalogs and maintenance manuals, and similar document excerpts. If descriptive data other than drawings is submitted, such data must be of sufficient quantity and quality to properly ascertain the nature of the modification. This includes defining all critical equipment, parts, and attachments, and identifying any components of the original aircraft that have been removed.

NOTE: Since parts catalogs are not FAA-approved documents, excerpts from parts catalogs alone are not sufficient.

**c. A "multiple" STC descriptive data package** should completely and accurately describe the fabrication, assembly, and installation of all portions of the modification. This includes: engineering drawings; material and manufacturing processes, specifications and tolerances; data necessary for fabrication of all parts and assemblies; and installation drawings and/or instructions. See

appendix 2. In addition, the descriptive data must be adequate for reproduction of parts and/or installation of subsequent modifications on other serial numbers of the same model TC product.

**d. Technical information** should include the following when applicable:

(1) Identification (title, drawing or report number, aircraft applicability, revision level, date, and applicant's name).

NOTE: When purchased Original Equipment Manufacture/Supplier parts, accessories and equipment are involved, whether new or used, provide purchase orders of other acceptable traceable documentation, including any name plate identification, part number, revision letter, serial number, etc.

(2) Materials used (and identified by material specification).

(3) Material test criteria and procedures.

(4) Fasteners used and location. (Each rivet, bolt, nut, screw, or other fasteners identified by specification - standard part numbers, such as Air Force - Navy Aeronautical Standard (AN), National Aerospace Standard (NAS), and Military Standard (MS), are acceptable.)

(5) Dimensions (with tolerances included).

(6) Manufacturer and part number of purchased parts (i.e. vendor data).

(7) Process specifications.

(8) Ratings and power requirements of electrical equipment.

(9) Electrical load analysis for the installation.

(10) Weight and balance data of assemblies and equipment items to be installed, and/or the complete modification. A complete list of parts added and/or removed. Updated aircraft equipment list.

(11) Installed placards.

(12) Instrument markings.

(13) Flight manual/supplement changes.

(14) Continued airworthiness instructions.

(15) EMI test report.

(16) Qualification test procedures and report.

(17) Software documents.

(18) Analysis reports.

(19) Test plans.

(20) Test reports.

**e. Design of equipment or components** to be installed, purchased and/or furnished, should be completely defined. If the item is TSO approved, the nameplate data may be adequate. Other equipment may require a source-control drawing identifying the equipment by manufacturer, part number, drawing number, revision level, or any other necessary data. Installation instructions for the modification should include all pertinent information provided by the equipment's manufacturer.

NOTE: When a multiple STC kit is sold, it should contain an inventory of ALL parts and installation instructions. Details of the parts manufacturing data that is proprietary will not be included in the kit.

**f. Process specifications** necessary for production of parts should be included in the descriptive data package. These specifications should include all materials, fabrication, and assembly procedures.

(1) Industry standards and specifications include those of Civil Aeronautics Manual (CAM) 18; the latest versions of AC 43.13-1A, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair; and AC 43.13-2A, Acceptable Methods, Techniques, and Practices Aircraft Alterations; various Society of Automotive Engineers Aerospace standards; AN; MS; and NAS

specifications; and various military handbooks. A copy of each standard and specification (except CAM 18, AC 43.13-1, AN, MS, and NAS) should be supplied as part of the descriptive data package. Certain industry standard specifications may be used, or specifications may be developed.

(2) Nonstandard specifications should include a complete and unambiguous definition of the materials to be used, detailed procedures, critical processes (e.g. temperatures, times, etc.), inspection criteria, rework limits, etc. The FAA will review any nonstandard specification.

**g. Installation instructions** should be adequately identified with a document number and an original issue/revision date, and should be complete enough to allow the installer to duplicate the installation. Each page of the instructions should be dated.

**h. A Flight Manual Supplement** should be provided to the pilot if required by the modification (refer to 14 CFR part 21, section 21.5), regardless of the method used to provide operating instructions on the original aircraft.

### 5-3. SUBSTANTIATING/COMPLIANCE DATA.

**a. In general**, substantiating and/or compliance data is intended to show compliance with the applicable regulations. This data may include: compliance checklists; analyses; test proposals and reports; and instructions for continued airworthiness and operations. Data from an existing STC may be used, provided a letter of authorization from the STC holder is obtained. A copy of this data and authorization letter should be submitted to the FAA if used.

NOTE: If the ACO engineer has relevant tests or other engineering data available from previous approvals, he/she may waive the requirement for an applicant to conduct such tests or submit duplicate data for a current STC application. The ACO engineer may use the relevant data for comparison purposes, but shall not disclose the data or its source to the current applicant.

**b. The compliance checklist** specifies each applicable certification rule and the method by

which compliance will be shown (e.g., analysis, structural test, ground test, flight test, etc.). It provides a concise, easily reviewed program outline which assures that all pertinent certification rules and their means of compliance are addressed. The compliance checklist should be prepared by the applicant after the certification basis is identified. See chapter 3. Each rule should be examined and identified for applicability to the proposed modification along with a method of showing compliance. The checklist can be updated later to identify the report, letter, test, etc. used to show compliance. For a sample format, see figure 2-5. Identification of appropriate certification rules may require the assistance from the FAA project team.

**c. A basic loads analysis** is necessary when the structure is modified or structural loads are changed. This establishes the applied loads (flight, ground, landing, etc.) which are determined from weight, center of gravity, power, and aircraft aerodynamic characteristics using design speeds, and load and safety factors specified in the certification basis. These loads, with the structural analysis and/or tests, form the foundation used to provide the required structural substantiation only if experience has shown this method to be reliable. Ultimate load testing may be required in cases where limit load tests may be inadequate.

NOTE: All structural loads should be approved by the ACO prior to stress or test. The ACO may have a DER recommend approval.

**d. Structural analyses** establish mathematically that the appropriate structural strength requirements have been met. These analyses build on the basic loads and material allowable data and may include: static stress, fatigue, fail safe, damage tolerance, etc. The applicant should assure that the analytical methods and assumptions used are applicable, that all pertinent loading conditions have been addressed, and that appropriate margins of safety have been shown for all structural elements.

**e. Allowable material** strength properties are established for the materials used in substantiating primary aircraft structure and the properties must be FAA approved. For metallic materials, the use of MIL-HDBK-5, Metallic Materials and Elements for Flight Vehicles

Structures, data is recommended (but other data may be acceptable). Nonmetallic materials may require the development of allowable data.

**f. Numerical analysis** of structures may be accomplished, with FAA approval, by using computer programs that define and validate each structure computer model through analysis routines and limited load tests.

NOTE: All computer programs used in any tests or analysis should be validated or previously approved by the FAA. Both stress and deflection results should match. Other validation methods may be possible when agreed to by the FAA.

**g. Safety assessments** evaluate the effects of foreseeable failures of the aircraft structure and/or systems. The depth and level of the detail is dependent on the severity of the failure conditions, functions performed, and the complexity and novelty of the aircraft. Faults that are undetectable are presumed to exist at the same time as each other single fault. Any necessary actions should be taken (system redesign, aircraft flight manual procedure changes, etc.) to correct unsafe conditions found as a result of an assessment. A safety assessment may also be required for aircraft systems.

**h. Test plans and reports** should be prepared for each required structural, component, ground test, and flight test. Test plans should include conformity inspection requirements and

should be submitted to the FAA for approval PRIOR TO assembly and testing of test articles.

**i. Instructions for continued airworthiness** describe any maintenance requirements necessary to maintain aircraft airworthiness and are provided in accordance with the applicable regulations, (e.g., 14 CFR part 23, section 23.1529; part 25, section 25.1529; part 27, section 27.1529; part 29, section 29.1529; part 31, section 31.82; part 33, section 33.4, or part 35, section 35.4). See appendix 5.

NOTE: For any STC application submitted after January 28, 1981, the applicant shall furnish at least one set of complete Instructions for Continued Airworthiness to the owner. See 14 CFR part 21, section 21.50.

**j. The weight and balance** manual, or Airplane/Rotorcraft Flight Manual (AFM/RFM) for the original type design, should be revised accordingly when modifications change the aircraft weight and balance and/or the operating limitations, procedures, performance, or loading instructions for the modified aircraft. The applicable weight and balance data is FAA approved and documented in a supplement to the original weight and balance report. Update aircraft equipment list.

**k. Structural life limits** are established based on fatigue test data with adequate factors of safety applied. New structural life limits may be required when modifications change an aircraft designed with safe - life structures.

## SECTION 2. THE DRAWING PACKAGE

### 5-4. GENERAL.

The drawing package describes the manufacture and installation of all parts necessary for the modification. All part contours, materials, manufacturing operations, dimensions, finish specifications, etc., are identified either directly on the face of the drawing or by reference to a process specification or other appropriate material.

NOTE: Drawings are a major portion of the descriptive data required for a multiple STC. All drawings must be DER or FAA approved prior to FAA acceptance and conformity

inspection. See 14 CFR part 21, section 21.33.

### 5-5. DRAWING NUMBERING SYSTEMS.

Drawing numbers should follow a logical pattern. For instance:

- a. 60000, Final Installation.
- b. 60100, Major Assembly.
- c. 60101, Detail.
- d. 60102, Detail.
- e. 60200, Major Assembly, etc.

**5-6. DRAWING REVISION LEVELS.**

**a. Each revision level** should identify the changes and approval dates on the drawing. These items should be reflected in the drawing list submitted with the drawing package for FAA approval.

**b. Minor design changes** (refer to 14 CFR Part 21, section 21.93 and 21.95), and major design changes (refer to 14 CFR part 21, section 21.93 and 21.97) to drawings and specifications should be submitted in a manner as determined by the ACO.

NOTE: After approval and issuance of the STC any change to the drawings should be submitted with the revised drawing list to the FAA for approval.

**5-7. GOOD DRAWING PRACTICES.**

Thoroughly checking drawings for accuracy and completeness prior to FAA submittal for review should reduce potential drawing returns and resubmittals due to unacceptable errors. See section 3.

**5-8. TOLERANCES.**

**a. Standard manufacturing tolerances** should be noted on the drawing, such as: XX.XXX inches  $\pm$  .010; XX.XX inches  $\pm$  .03; XX X/X inches  $\pm$  1/16; with tolerances which differ from these standards called out on the face of the drawing, (i.e., .625 + .001, - .000).

**b. The magnitude of tolerances** is critical. Unnecessary narrow and/or broad tolerances should be avoided, as manufactured parts are rejected if tolerances are not met. See ANSI Specification Y14.5.

**5-9. DRAWING LIST.**

A drawing list, or Master Drawing List (MDL), should be prepared and submitted with the drawings. This list should include installation instructions, any process specifications, drawing or document number, revision level, any engineering change orders in effect, the date prepared, and the approval dates of all material. See appendix 2.

**5-10. EXAMPLES.**

**a. A drawing list and several sample drawings** for the Acme Aircraft Corporation flap hinge bracket installation are located in appendix 2, demonstrating one way of meeting drawing package requirements. Process specifications for plating and inspection, as well as the installation instructions, are included in the drawing list, and they are divided into installation and manufacturing data. A revision control page is shown, but may not be needed on a very short drawing list.

**b. Drawing examples** showing a detail part, a subassembly, and an installation are also included in appendix 2. They illustrate the type of information required on drawings of various types and an acceptable way of organizing a drawing system.

**SECTION 3. GENERAL GUIDELINES FOR CHECKING DRAWINGS****5-11. GENERAL.**

Prior to FAA submittal, completed working drawings should be reviewed, via a guide or a system, by someone OTHER THAN the person responsible for drafting the drawings. In the case of descriptive data, the first such check may be performed by the engineer. The following is an example of a drawing checklist.

**5-12. ORDER OF CHECKING.**

**a. The perspective** of whether an accurate and complete design is portrayed should be realized before reviewing the contents of the drawing.

**b. Each part** should be correctly designed and illustrated with all necessary views of the part shown on the drawing.

**c. Dimensions.**

(1) Accuracy of all dimensions should be checked by scaling and, where advisable, also by calculation.

NOTE: All calculations should be preserved.

(2) Completeness of the dimensions should be checked to verify no adding or subtracting is required for a needed dimension.

**d. Tolerances** should not be too “fine” or too “coarse,” which might impact the duplication accuracy or operation.

NOTE: Each production part should meet or exceed the established tolerances.

**e. Finishes** should be checked for proper specification on each part and assembly drawing.

**f. Material specifications** should be checked to verify that every specification is correct and that all necessary information is given.

**g. Part compatibility.**

(1) Interference, or compatibility of each adjacent part, should be checked in the final assembly to assure proper clearances. The “worst case” tolerance limits should be used.

(2) Mechanical movement clearances should be laid out to scale and checked for interference (and considering tolerances) in all positions at the extreme limits of travel.

**h. Detail parts** should be checked to verify all screws, bolts, pins, rivets, etc., are standard aircraft quality parts and that, where applicable, stock sizes have been utilized.

**i. The Title block** should present the following information:

(1) A drawing number to identify the print for filing purposes and to prevent confusing it with other prints.

(2) The name of the part or assembly.

(3) The scale to which it is drawn.

(4) The date.

(5) The name and address of the applicant and firm.

(6) The name of the draftsmen, checker, and person approving the drawing.

(7) The aircraft model, detail or assembly it is to be used on.

(8) The drawing number of the next higher assembly.

**j. The Bill of material block** should present the following information:

(1) The number of the part or assembly.

(2) The name of the part of assembly.

(3) The material from which the part is to be constructed.

(4) The quantity required.

(5) The source of the part or material.

**k. The Revision block** should present the following information:

(1) The identification symbol.

(2) The listing of the numbered or lettered changes (A through Z is followed by AA through ZZ; I, O, Q, and X are never used).

(3) The date.

(4) The nature of the revision.

(5) The authority for the change.

(6) The name of the draftsman who made the change.

NOTE: To distinguish the corrected drawing from its previous version, the Title block may contain a space for entering the appropriate symbol to designate that the drawing has been changed or revised.

**l. Other details** should be reviewed:

(1) The border around the drawing defining the work area should be  $\frac{7}{8}$  inch to  $\frac{1}{2}$  inch from the edge.

(2) The dimensions and views should be sufficient in describing the part or assembly, including a full sectional view of assembled parts.

Decimal dimensions are desirable. Views with hidden lines should be avoided when possible, and dimensions to hidden lines should not to be used.

(3) Tolerances on the drawing should be noted when different from those called out in the title block.

(4) Parts should be indicated by a noun, followed by a description of what they do, and where they are located on the aircraft.

(5) The finish operation/process should be indicated, such as: cadmium plate, zinc chromate coat, anodize, shot peen, tumble, sand blast, vinyl wash, epoxy, etc.

NOTE: Zinc chromate and vinyl wash denote primers; final finishes should be specified as well (e.g. enamel, epoxy, lacquer, dope, etc.). A complete designation of a finish process/operation should include a reference to a specification.

(6) Standard tolerances specified by applicant/designer should be indicated.

(7) General notes are not referenced from the field of the drawing but apply "Unless Otherwise Noted".

(8) Specific notes (also listed under the general notes column) apply to particular parts, areas or operations, and are usually referenced from the field of the drawing by the note number enclosed within a triangle.

**m. The drawing** should be reviewed in its entirety, adding explanatory notes (as needed) that will increase its utility.

**n. Sources.** French & Vierck, Fundamentals of Engineering Drawing, pp. 365-6, McGraw-Hill, Inc., 1960; Drawing Requirements Manual, and Airframe and Power Mechanics General Handbook, Chapter 2, -- U.S. Government Printing Office; and Global Engineering Documentation Services, Santa Anna, California.



## CHAPTER 6. INSPECTIONS

### 6-1. GENERAL.

Conformity and compliance inspections are required during STC application projects. See the latest revision of FAA Order 8100.4, Type Certification Process.

### 6-2. CONFORMITY INSPECTIONS.

**a. Conformity inspections** are required to verify that an aircraft component or modification conforms to the data submitted to the FAA, and that the product being certificated complies with the Type design. These inspections physically compare the component or modification to the engineering specifications, drawings, and the airworthiness standards. Conformity inspections are instigated by filling out FAA Form 8110-1, Type Inspection Authorization or FAA Form 8120-10, Request for Conformity, and submitting it to the MIDO through the ACO project engineer. Conformity inspections are recorded and reported on FAA Form 8100-1, and FAA Form 8130-3 is completed if required. See appendix 4 and the latest revision of FAA Order 8110.4.

NOTE: An FAA conformity inspection should be successfully conducted before any official FAA tests (ground or flight) are conducted. Conformity inspections are requested by FAA engineering.

**b. Conformity Inspectors** may either be Aviation Safety Inspectors (Manufacturing), or FAA authorized Designated Manufacturing Inspection Representatives (DMIR), and manufacturing DAR's. FAA manufacturing aviation safety inspectors are located at various MIDO's throughout the certifying directorate.

**c. FAA Form 8130-9, Statement of Conformity**, ensures that parts are manufactured and/or installed to the latest revision of the descriptive data, prior to FAA inspection. The applicant signifies this by signing FAA Form 8130-9 and noting any deviations listed. In addition, for completed products, the applicant is required to certify that the modified aircraft, engine, or propeller is in conformity with the original Type Design, except as affected by the

modification being presented for approval and by other previously approved modifications.

**d. Test articles** are built in accordance with engineering data. All components which are to be part of an initial STC modification and require tests, other than flight tests, (such as structural, fuel flow, etc.), require a complete part conformity inspection before the test is started unless prior authorization is obtained to allow a post test conformity inspection. All modifications which require flight testing must have a complete conformity inspection via the TIA, be tagged (FAA Form 8130-3), and have a satisfactory installation conformity before FAA ground or flight tests can be conducted. See FAA Order 8110.4.

**e. Progressive inspections** may be conducted by the manufacturing aviation safety inspector at appropriate intervals during the modification process if coordinated early in the project.

### 6-3. COMPLIANCE INSPECTIONS.

These are required to verify that a particular component or modification to an existing design meets the requirements of the applicable 14 CFR's or CAR's through a combination of specification review and physical inspection of the component, installation, or aircraft. FAA engineering and AEG personnel or an authorized DER arranges and conducts these inspections. See the latest revision of FAA Order 8110.4.

### 6-4. PARTS MANUFACTURER APPROVAL (PMA) AND PRODUCTION INSPECTIONS.

If production parts are to be manufactured prior to obtaining a "multiple" STC, control over all manufactured "production" parts should be maintained by the applicant until FAA approval of the STC and production. Production parts produced prior to PMA approval should not be shipped. Design changes may require additional certification testing. The MIDO will only do conformity inspections on parts required for ground or flight tests required to obtain STC approval. They will not inspect production parts. See Order 8120.9 and Advisory Circular 21-32A.

NOTE: MIDO/Manufacturing DAR's may inspect multiple ship sets of parts, some used for the STC and some designated for production, if the parts are required to be shipped to a remote site where the test and production aircraft are being modified.

**6-5. TYPE INSPECTION AUTHORIZATION.**

A TIA specifies installation conformity inspection and certain ground and required flight tests to be performed by the FAA or FAA designee. It also requires submittal of FAA Form 8130-9 stating that the article has been inspected and corresponds to the design data. The FAA inspector or designee will then verify conformity. See 6-2.d. above and chapter 7.

## CHAPTER 7. TYPE INSPECTION AUTHORIZATION

### 7-1. GENERAL.

The TIA details and authorizes the required conformity and airworthiness inspections, and ground and flight tests necessary to fulfill the requirements for the certification process. It may also contain an operational and maintenance requirements section. The TIA is prepared by the ACO when coordination is accomplished with the appropriate FAA engineering, manufacturing inspection, and flight test organizations. Issuance of the TIA will occur when the examination of the technical data required for the certification is completed or has reached a point where the aircraft or component will meet the pertinent regulations. Prior to final TIA approval and FAA certification flight tests, the applicant should participate in a flight safety board meeting. FAA certification flight testing commences only after the applicant successfully completes his/her flight tests, the TIA is issued, and section 18A of the TIA is completed. See FAA Order 8110.4.

### 7-2. FAA FORM 8110-1, TYPE INSPECTION AUTHORIZATION.

This TIA form is the cover page which provides basic information about the name of the applicant, aircraft type, certification basis, nature of the type design or modification, certification project number, and internal FAA coordination.

### 7-3. TIA DESCRIPTION.

The second page contains general information, including a description of the type design or modification and unique features or special interfaces. This section may list the applicable 14 CFR's and/or any FAA policy in which compliance will be shown.

### 7-4. TIA SECTION 18. PART I.

This section contains conformity instructions requesting FAA manufacturing inspection to verify the new aircraft or component conforms to the applicant's approved design data. This section may

outline any other required ground inspections required by engineering. It may also define and specify the type of airworthiness certificate required.

### 7-5. TIA SECTION 18. PART II.

This section contains a set of instructions requesting FAA to perform specific flight tests to demonstrate that the aircraft or aircraft modification complies with the FAA regulations. The flight test plan submitted for FAA approval is typically referenced or embodied in this section of the TIA. The Flight Test Plan should contain clear, detailed procedures allowing the FAA crew to conduct the flight test and make a determination of pass or fail.

### 7-6. TIA SECTION 18. PART III.

This section typically contains the AEG, (FAA's certification and flight standards liaison), instructions and/or test sets that require the aircraft or aircraft modification compliance operational regulations. This section also is needed when the nature of the type design or type design change may affect the pilot type rating, procedures, pilot training program, Master Minimum Equipment List (MMEL), or the aircraft maintenance procedures.

### 7-7. SUPPLEMENTAL TYPE INSPECTION REPORT (STIR).

The Supplemental Type Inspection Report (STIR), FAA Form 8110-26, should be prepared to document the results upon satisfactory completion of all TIA inspections and tests. These results should be reported by the individuals who performed the inspections and tests (i.e., the FAA manufacturing aviation safety inspector or conformity inspection or authorized designee for tests, as applicable, and the FAA test pilot and flight test engineer or authorized DER for compliance inspections, ground tests, and flight tests). If the STIR is prepared by a designee, the report must be submitted to the FAA for review and approval.



## CHAPTER 8. TESTS

### 8-1. GENERAL.

Depending on the complexity of the project, several types of testing may be required for an STC. Prior to any certification testing, the test plan must have been approved by the FAA and the test article must have a complete part and installation conformity inspection. See chapter 6 and the latest revision of Order 8110.4.

### 8-2. COMPONENT TESTS.

Prior to completion of the modification or installation, testing may be necessary to verify that certain detail parts, components, or subassemblies meet the applicable regulations. Test proposals for each certification test should be submitted to the FAA for review to preclude unnecessary or unacceptable tests. Upon approval of the test proposal, the FAA project engineer will issue FAA Form 8120-10, Request for Conformity, for inspection on the test fixture and test article(s) to the MIDO. The MIDO (or designee) will conduct the conformity inspection. The tests should then be witnessed by either the FAA project engineer or an authorized DER.

### 8-3. GROUND TESTS.

**a. Electromagnetic Interference (EMI),** environmental, fuel flow, structural, or similar ground tests may be necessary when the modification or installation is complete. A test proposal for all such tests should be submitted to the FAA for review and approval prior to testing. See chapter 7.

**b. Aircraft that employ electronic engine controls,** commonly named Full Authority Digital Engine Controls (FADEC), are recognized to be more susceptible to EMI than aircraft that have only manual (non-electronic) controls. For this reason, acceptable system performance should be attained by demonstrating that the critical function components of the system under consideration, continue to perform their intended function during and after exposure to required electromagnetic fields. Deviations from system specifications may be acceptable, but must be independently assessed by

the FAA on a case-by-case basis. See Federal Register; fr29ja97R, Docket No. 97-ASW-1.

### 8-4. FLIGHT TESTS.

**a. Applicant Flight testing** precedes issuance of the TIA. The FAA will review the applicants flight test reports and repeat some or all of the tests as necessary. These repeated tests will be identified and performed per the FAA issued TIA.

**b. FAA will perform flight tests** for modifications which could affect the aircraft's performance, flight characteristics, powerplant operation, and/or overall handling qualities. Changes to systems, equipment, instrumentation, and flight manuals may also require flight tests. Any modification which may affect the noise signature and/or navigation of the aircraft (including performance changes) will usually require flight testing. The FAA project engineer can provide general information on the types of tests which may be required.

NOTE: Successful completion of the TIA tests by the FAA is one of the final steps to STC issuance.

### c. Applicant testing.

(1) Research and development flight tests are to ensure the design changes are in compliance with the applicable 14 CFR's. The FAA will not participate in or witness these tests. However, the FAA will discuss and provide general guidance in order that such tests can be made meaningful and safe. Alternatively, a Flight Test Pilot DER may be utilized to perform such tests.

(2) Flight test proposals are based on the knowledge of the modification and development tests. The proposal should be based on the certification basis and include recommended tests, instrumentation to be used, necessary safety equipment, data acquisition, and reduction methods. Upon approval of the test proposal, descriptive and compliance data, and conformity established with the data, the FAA will issue a TIA. FAA flight test personnel should then be contacted to assure that

potential hazards are recognized, the required test methods and criteria are understood, and for concurrence.

NOTE: An applicant's flight test report should be submitted to the FAA for review upon successful completion of the inspection and test requirements equivalent to those required in the TIA.

**d. FAA testing** may include repeating of tests, partially or in their entirety, to verify compliance to the certification requirements. FAA testing may be accomplished by an FAA pilot or an authorized DER flight test pilot.

**e. Installation Conformity inspection** of the modified aircraft to be used for flight tests will be performed by the FAA or FAA designee prior to FAA testing. If discrepancies are found, they should be corrected and any test which could have been influenced may be repeated before further tests are performed by the FAA.

**f. Aircraft weight and the Center of Gravity (CG)** location that is current and accurate is extremely important to assure the modified aircraft can be loaded to the critical weight and CG limits for flight testing. The aircraft to be used for official flight tests should be weighed and witnessed by an FAA representative before testing begins. The resulting weight and balance determination will be carefully checked by the FAA and, when found to be accurate, will be used for all subsequent flight test weight and CG calculations.

**g. Ballast** necessary for flight testing should be securely restrained in such a manner as to withstand the inertial loads resulting from a survivable emergency landing. The preferred form for ballast is small, solid pieces of a high density metal (lead, cast iron, steel, or depleted uranium) fixed to the structure or in a suitable container that is fixed. Using passengers as ballast is not acceptable.

**h. Instrument calibration**, when required, should be accomplished by an approved instrument repair inspector prior to the FAA flight test

program with calibrated cards provided. Types of instruments to be calibrated may include: altimeters, tachometers, temperature gauges, airspeed indicators, etc. Calibrations should be performed within 3 months of the test. However, on critical items, this requirement may be 30 days.

NOTE: Usually, the entire airspeed system is calibrated before flight testing.

**i. Rapid emergency egress provisions** will be demonstrated to the FAA inspector and pilot for acceptability prior to FAA flight tests. Parachutes will be provided to the FAA, if required.

**j. Experimental Airworthiness Certificates**, or special flight permits, are issued before operation for any aircraft which does not have a valid TC, or does not conform to its TC. Although the operations may eventually lead to a TC, they may be conducted only as a matter of research, or to show compliance to the appropriate 14 CFR.

**k. Flight manual supplements**, or if an FAA approved Aircraft Flight Manual (AFM) does not exist, a supplemental flight manual, if required, will be provided to the pilot as a result of the modification, regardless of the method used on the original aircraft. A draft flight manual should be provided to the FAA prior to any flight tests. After FAA flight testing, the draft manual should be finalized and submitted for FAA review and approval. A guide for the format and preparing of a supplemental flight manual is provided in appendix 5 of AC 23-8A, AC 27-1, and AC 29-28.

NOTE: The aircraft TCDS should be checked for identification of the FAA approved Aircraft Flight Manual, if appropriate. TCDS of many older aircraft state placards and markings are required (in lieu of a flight manual). Manufacturer owners' manuals may not be FAA approved.

## 8-5. SIMULATOR TESTS.

Simulator tests may be required for certain projects, and all such test proposals should be submitted to the FAA for review and approval.

## CHAPTER 9. ADMINISTRATIVE ACTIONS

### 9-1. ISSUANCE OF STC.

Once all required inspections and tests are completed and compliance with the applicable regulations has been verified, the FAA can prepare and issue the STC, FAA Form 8110-2. The STIR should be completed within 90 days after certification issuance.

### 9-2. CANCELLATION OF PROJECT.

Projects that are inactive for more than 6 months are subject to FAA notification and/or cancellation and returning of all data, but may be pursued by resubmitting the application and data.

### 9-3. TRANSFERRING OWNERSHIP OF AN STC.

In all cases, the owner or authorized agent should endorse the back of the original STC, submit it to the issuing ACO (as shown on the front of the certificate). In the case of an STC issued to an organization, an affidavit certifying authorization to execute the transfer on behalf of the STC holder is included. See FAA Order 8110.4. The FAA will then:

**a.** Cancel the endorsed STC and file it in the STC data file. See chapter 2-5.

**b.** Reissue the certificate in the name of the new owner, retaining the same STC number, the original application date, the original issue date, and the new reissue date.

**c.** Forward the data file on the STC to the ACO covering the new owner's facilities if the new owner is located in another geographic area. The new owner will be notified to contact the appropriate (geographic) ACO responsible for all matters concerning the STC and the appropriate (geographic) MIDO for matters concerning any PMA activity associated with the STC.

### 9-4. USE OF AN AVAILABLE STC.

**a. If the STC holder agrees** to permit another person to use the certificate to modify an aircraft, aircraft engine, propeller or appliance, the holder must issue a written permission statement, in a form acceptable to the Administrator, to each applicable persons making alterations based on his/her STC. If an STC holder is making the alteration to their own aircraft, aircraft engine, propeller, or appliance only, the permission statement provision does not apply. See 49 U.S.C. 44704.

**b. The installer, mechanic, or repair station** which has obtained permission directly from the STC holder to use the STC shall furnish a copy of the STC holder's permission statement to the modified product owner/operator before completion of the alteration. See 49 U.S.C. 44704.

**c. A copy of each permission statement** should be retained by the STC holders, installers, and the owner/operator of the product on which an STC alteration is installed.

**d. The following notification statement** should be located on page one of Form 8110-2 under the "Limitations and Conditions" section, directly ahead of the statement "This certificate and the supporting data...": "If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission."

**e. The form of the permission statement** to be acceptable to the Administrator, should as a minimum contain the following:

(1) A written statement of the agreement specifying product(s) to be altered.

(2) The STC number.

(3) The person(s) being given consent to use the STC.

Other information may be listed if the STC holder so desires such as; the effective date, how many times the STC may be used for fleets of aircraft, etc.

#### **9-5. AMENDMENTS TO STC.**

**a. “Multiple” STC’s** may be amended to add new models, show revised data, etc.; but the certificate will be amended with the original STC number and an amendment date. The amendment date will be placed in the “Date Amended” block. A certificate will not be amended to add different modifications to the same type design.

**b. “One-only” STC’s** will not be amended to become a “multiple” STC. New “One Only” STC’s will not be issued for the same modification. If the STC owner/applicant desires a “multiple” STC for the same type “one-only” STC installation, the STC owner/applicant should upgrade the design and make application for a separate new “multiple” STC with a new STC number. As with any other “multiple” STC application, sufficient data should

be submitted to verify that manufacturing and installation of the design may be duplicated on the additional aircraft, engines, or propellers. See FAA Order 8110.21.

#### **9-6. DURATION OF AN STC.**

An STC is effective until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

#### **9-7. LOSS OF AN STC.**

The local ACO should be immediately notified (by the STC owner) in writing of the circumstances of the loss of an STC. A duplicate STC will be issued retaining the original number. A statement on the face of the STC will identify it as a replacement. If the original certificate is later found, it should be returned to the FAA ACO for processing and retention in the STC records. Under no circumstances should two original certificates exist with the same STC number.

**APPENDIX 1. FAA FORM 8110-12, APPLICATION FOR TYPE CERTIFICATE,  
PRODUCTION CERTIFICATE, OR SUPPLEMENTAL TYPE CERTIFICATE  
(2 pages)**

Complete one copy of FAA Form 8110-12 as follows (refer to sample form at the end of this appendix):

Item 1. Name and address of person(s) or business concern(s) who own(s) the STC.

Item 2. Check the block for "Supplemental Type Certificate."

Item 3. Check the product involved (aircraft, engine, or propeller).

NOTE: An STC application for a change to an engine or propeller usually requires another STC application for installation on an aircraft. Also, models having different TC's will require separate STC applications for the same change. Submit the appropriate number of applications.

Items 4 and 5. Omit these items for STC application.

Item 6.

- a. List the manufacturer of the aircraft, engine, or propeller and the specific models to be included as shown by the identification plates. These designations are also listed in the applicable specification, or data sheet, which may be examined at local FAA offices. Popular names such as "Cub," "Skylane," etc. should not be used.

NOTE: If the requested approval is for a "one-only" aircraft, engine, or propeller, the applicant should indicate the applicable serial number.

- b. Use this space for a brief narrative description of the change. Include descriptive data such as installation instructions and/or drawing lists (for major changes) if they are available at the time of application. (See sample form.)
- c. 1. Answer "No" if descriptive data and parts will not be made available to others. Descriptive data must completely describe the change, but may consist of marked photographs, sketches, and word descriptions. Detailed installation instructions are not required for a "one-only" installation intended for one specific aircraft. STC modifications intended for multiple aircraft installations must have installation instructions with sufficient detail to assure repeatability.
2. Answer "Yes" if descriptive data and parts are made available to others. Installation instructions and good quality descriptive data are required for duplicate parts and installation.
- d. 1. Answer "No" if descriptive data will be made available, but parts will not be supplied. Data requirements are the same as for 6.c.2.
2. Answer "Yes" if installation instructions and parts will be made available. Installation instructions are required which will permit duplication of the installation to the standards required for certification.

NOTE: When 6.d.2. is answered "Yes" and the STC has been approved, compliance with 14 CFR part 21, section 21.303 will be required as evidence of inspection approval or manufactured parts.



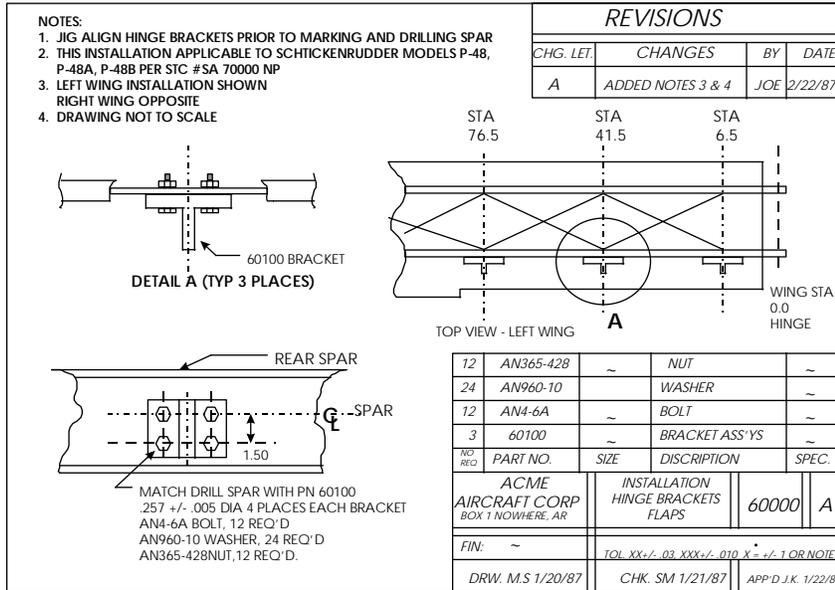
**APPENDIX 2. SAMPLE DRAWING PACKAGE (3 pages)**

This appendix includes a two-page sample drawing list and three sample drawings (sample installation drawing, sample assembly/subassembly drawing, and sample part fabrication detail drawing) for the Acme Aircraft Corporation flap hinge bracket installation.

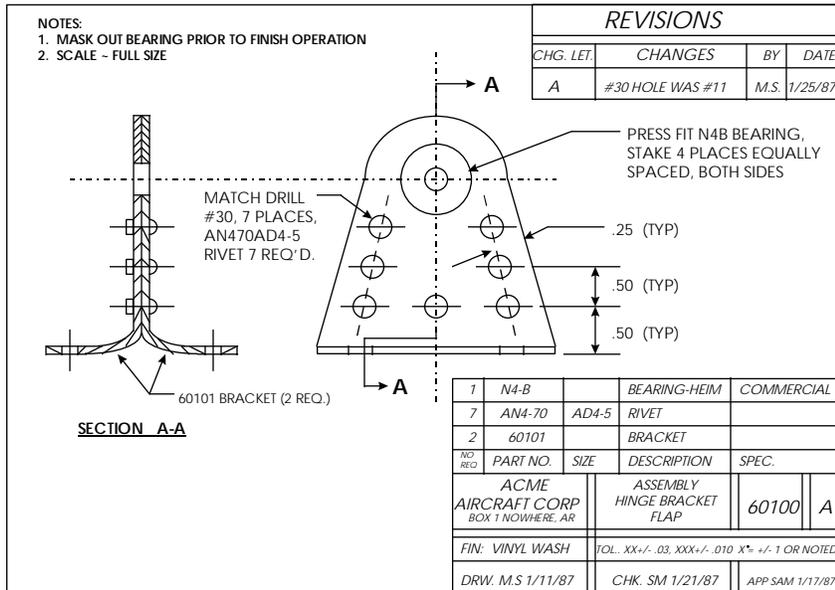
Acme Aircraft Corporation Drawing List 60DL Flap Hinge Bracket Installation (P-48 Series) Revision Control Page Page 1 of 2			
<u>Revision</u>	<u>Date</u>	<u>Page Nos. Affected</u>	<u>Approved</u>
N/C	01/02/88	1, 2	<u>(approval signature)</u>
A	01/25/88	1, 2	<u>(approval signature)</u>
Company Approved: <u>(approval signature)</u> Date: 01/25/88			

Acme Aircraft Corporation Drawing List 60DL Flap Hinge Bracket Installation (P-48 Series) Page 2 of 2			
<u>Document Number</u>	<u>Title</u>	<u>Rev.</u>	<u>Date</u>
Installation Data	Installation Instructions	A	07/05/87
60-II	P-48 Series Flap Hinge Bracket		
60000	Flap Hinge Brackets Installation	A	02/22/87
Manufacturing Data			
60100	Flap Hinge Bracket Assy.	A	01/25/88
60101	Wing Flap Hinge Bracket	B	01/25/88
•			
•			
AAC41	Epoxy Specification	N/C	04/19/86
AAC60	Inspection Procedures	N/C	01/02/88
Company Approved: <u>(approval signature)</u> Date: 01/25/88			

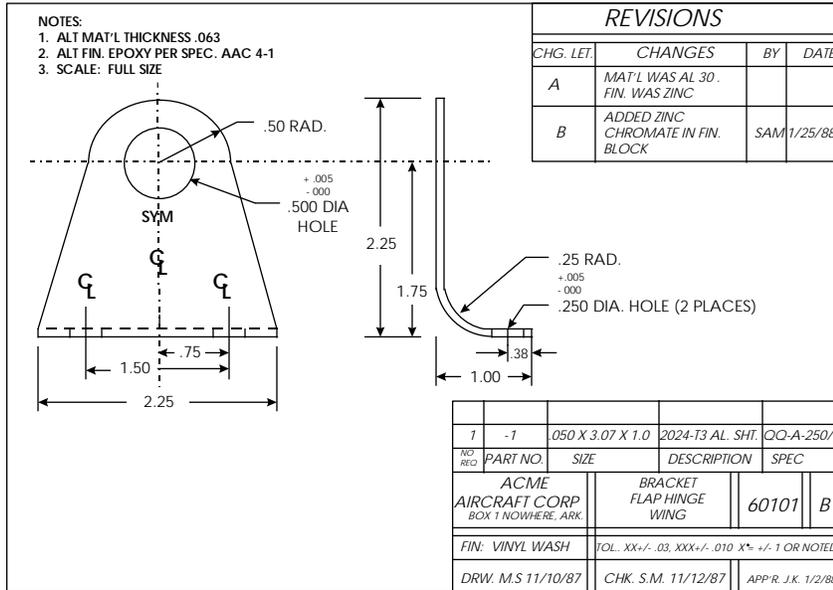
### Sample Installation Drawing



### Sample Assembly/Subassembly Drawing



### Sample Part Fabrication Detail Drawing





APPENDIX 3. SAMPLE SUPPLEMENTAL TYPE CERTIFICATE (1 page)

United States of America  
Department of Transportation -- Federal Aviation Administration  
**Supplemental Type Certificate**

*Number* SA70000NP

*This certificate, issued to* Acme Aircraft Corporation  
Box 1  
Nowhere, Arkansas 71953

*certifies that the change in the type design for the following product with the limitations and conditions therefor as specified herein meets the airworthiness requirements of Part 23 of the Federal Aviation Regulations.*

*Original Product -- Type Certificate Number:* A992Z-4  
*Make:* Schtickenrudder Aviation, Inc.  
*Model:* P-48, P-48A, P-48B

*Description of Type Design Change:*

Installation of wing flap hinge bracket (P/N 60000) in accordance with Acme drawing list 60DL, Rev. A, dated 01/25/88, or later FAA approved revision.

*Limitations and Conditions:*

Compatibility of this installation with previously installed equipment must be determined by the installer. FAA approved Flight Manual Supplement, dated 08/22/88, or later FAA approved revision, is required.

*This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.*

*Date of application:* 01/03/88  
*Date of issuance:* 09/14/88

*Date reissued:*  
*Date amended:*  
*By direction of the Administrator*



(ACO Manager signature)

(Signature)

(ACO Manager title)

(Title)

*Any alteration of this certificate is punishable by a fine of not exceeding \$2,000, or imprisonment not exceeding 3 years, or both.*



### APPENDIX 4. GUIDE FOR PREPARING FAA FORM 8120-10, REQUEST FOR CONFORMITY (3 pages)

 U. S. Department of Transportation <b>Federal Aviation          Administration</b>	<h2 style="margin: 0;">REQUEST FOR CONFORMITY</h2>
To: _____ <b>1 (a)</b> _____ Attention: _____ <b>1 (b)</b> _____ _____ _____	
<b>Request for Conformity Inspection</b> <span style="float: right;">Project No.: _____ <b>2</b> _____</span>	
<input type="checkbox"/> Part Conformity _____ <b>4(a)</b> _____ Date: _____ <b>3</b> _____ <input type="checkbox"/> Installation _____ <b>4(b)</b> _____ <input type="checkbox"/> Other _____ <b>4(c)</b> _____	
<b>A conformity inspection pertaining to the subject is requested for the following:</b>	
Applicant Name: _____ <b>5</b> _____ Company Name: _____ <b>6(a)</b> _____ Street: _____ <b>6(b)</b> _____ City: _____ <b>6(c)</b> _____ State: _____ <b>6(d)</b> _____ Zip: _____ <b>6(e)</b> _____	
Time/Date available: _____ <b>7</b> _____ <input type="checkbox"/> Applicant will contact FAA Type Installation: _____ <b>8</b> _____ Make/Model: _____ <b>9</b> _____ Quantity: _____ <b>10</b> _____ Requesting Document (P.O.) and Date: _____ <b>11</b> _____ Design Data: (with Revision/Date): _____ <b>12</b> _____ _____ _____	
Special Instructions: _____ <b>13</b> _____ _____	
Contact: _____ <b>14(a)</b> _____ at: _____ <b>14(b)</b> _____ <span style="margin-left: 150px;">(Phone Number)</span>	
FAA Project Manager: _____ <b>15(a)</b> _____ Phone: _____ <b>15(b)</b> _____ Remarks: _____ _____ _____	
<input type="checkbox"/> T.I.A. Issued <span style="margin-left: 150px;"><input type="checkbox"/> FAA Form 8100-1 Required</span> <input type="checkbox"/> T.I.R. Required <b>17</b> <span style="margin-left: 150px;"><input type="checkbox"/> FAA Form 8130-9 Required</span> <input type="checkbox"/> 8130-3 Tags Required	
Note: Please return this request for conformity with the FAA conformity document to _____ <span style="margin-left: 150px;"><b>18</b></span> _____	

## INSTRUCTION FOR COMPLETING FAA FORM 8120-10 REQUEST FOR CONFORMITY (RFC)

SECTION	REQUIRED INFORMATION
1(a)(b)	Leave blank. The MIDO will route the RFC to the proper office.
2	Enter the FAA project number obtained from the ACO assigned project manager.
3	Leave blank. FAA project manager/engineer will enter date.
4(a)	Put an "X" in this box when the request is for a part(s), assembly, or a kit of parts.
4(b)	Put an "X" in this box when the request is for a conformity inspection of an installation on an aircraft.
4(c)	Put an "X" in this box if the conformity inspection is for test articles (specify; flammability, structural, endurance, etc.) or a test setup.
5	Enter the person's or company's name applying for the FAA design approval.
6(a)(b)(c)(d)(e)	Enter the name and address where the conformity inspection will take place. In the case of a parts conformity or test article inspection, this entry should reflect the location where the parts were actually produced. Often this location is at a supplier's facility.
7	Enter an approximate time and date when the inspections are scheduled to take place. However, this time and date does not constitute a commitment by the FAA. Always place an "X" in the box adjacent to the words "Applicant will contact FAA."
8	Enter a brief description of the part, test article, or installation for which the conformity inspection is being requested. (Examples: hydraulic motor, flammability test articles, coat closet installation. For part(s) conformity references to part number(s) is acceptable.)
9	Enter the make and model of the aircraft, engine, or propeller for which the design approval is being requested. (Example: McDonnell Douglas Corporation MD-11F, Bell 206-L4.) The make and model should match those referenced on TCDS.
10	Enter only the quantity of articles necessary to complete the type certification program. This quantity is normally one article or one ship-set. If more than one is necessary to complete the test program, then that quantity should be agreed upon in advance with the FAA project manager and the assigned manufacturing aviation safety inspector. For test articles, the quantities are usually called out in a test plan which is approved in advance by the FAA project manager. In these cases, write "Per Test Plan" in the quantity section.
11	Some companies use purchase order references to send conformity inspection information to their suppliers and the FAA. However, in most cases this section is not used, and an entry of "N/A" (for not applicable) is appropriate.

**SECTION****REQUIRED INFORMATION**

- 12 Enter a complete description of design data to be used in inspection of parts, installation, or test articles. References to engineering drawings and test plans, with revisions and dates, are required. References to software revisions, if not incorporated in production drawings, are required. Do not include part numbers in this section. If there are multiple drawings, the information may be entered on a separate attached sheet with a note in section 12 which states; "See attached sheet(s)." For installation conformity inspections, an entry of a master drawing list is usually adequate without additional information.
- 13 Enter any special instructions which may aid the inspector in conducting the conformity inspection. (Example: A static test article for a coat closet may not need to have decor applied for test purposes. Special emphasis areas such as special process evaluations or the need to record or collect certain calibration records should be requested in this section.)
- 14(a)(b) Enter the name and telephone number of the person to contact at the site where the inspection is to be performed. This contact usually corresponds with the information required in section 6 (a)(b)(c).
- 15(a)(b) Enter the name and telephone number of the FAA project manager.
- 16 Enter any information that may help the conformity inspection to be conducted in a timely and efficient manner. (Examples: Statements such as "Applicant wishes to use DAR Mr. Bill Smith (ANM-999999-DAR), Van Nuys MIDO, to conduct conformity inspection" or "Applicant wishes to use the Australian CAA to witness Flammability test in Sydney on June 10, 1995.")
- 17 Enter an "X" in the blocks adjacent to "FAA Form 8100-1 Required," "FAA Form 8130-9 Required," and "FAA Form 8130-3 Tags Required" when a part conformity or other inspection has been requested in section 4(a) or (c) above. (FAA Form 8130-3 is required when inspection articles will be moved or shipped from the inspection site to a remote testing site and assurance of article inspection is desired.)
- 17 Enter an "X" only in the blocks adjacent to "FAA Form 8100-1 Required" and "FAA Form 8130-9 Required" when an installation conformity has been requested in section 4(b) above. Do not use the blocks "TIA Issued" or "TIR Required."
- 17 Enter an "X" in the TIA issued block when the request is being utilized to supplement a previously issued TIA.
- 17 Enter an "X" in the TIR required block to have any related conformity inspection records placed in the pending TIR (when a TIA has been issued).
- 18 Enter the name and office symbol of the FAA project manager noted on block 15(a).



**APPENDIX 5. SAMPLE INSTRUCTIONS FOR CONTINUED AIRWORTHINESS  
(1 page)****SAMPLE****14 CFR part 25, section 25.1529 - Instruction for continued Airworthiness**

(Applicants Company Name, Address, and Date)

TITLE: Maintenance Requirements - Instructions  
for Continued Airworthiness

DRAWING or Manual or Document I.D.

NO.

“Modification of an aircraft by this Supplemental Type Certificate obligates the aircraft operator to include the maintenance information provided by this document in the operator’s Aircraft Maintenance Manual and the operator’s Aircraft Scheduled Maintenance Program.”

1. Maintenance Manual information (system description, operation, location, removal, installation, testing, etc.) is contained in (Applicant’s Name) Installation Manual Number \_\_\_\_\_, and should be placed into the operators appropriate airplane Maintenance Manual.
2. Line Replaceable Unit (LRU) part numbers and other necessary part numbers contained in the installation data package should be placed into the aircraft operators appropriate airplane Illustrated Parts Catalog (IPC).
3. Wiring diagram information contained in this data package should be placed into the aircraft operators appropriate airplane Wiring Diagram Manuals.
4. Scheduled Maintenance Program tasks to be added to the aircraft operators appropriate airplane maintenance program are as follows:
  - a. Recommended periodic scheduled servicing tasks such as lubrication, replacements, overhauls, etc. as required.
  - b. Recommended periodic scheduled preventative maintenance tests/checks to determine system condition and/or latent failures as required. i.e. Condition Monitored, On-Condition, etc.
  - c. Recommended periodic scheduled inspections such as general visual inspections or detailed inspections for system integrity, security, wear, chaffing, etc. as required. These may appear as part of opportunity inspections or recommended Zonal inspection tasks.
  - d. Recommended periodic structural inspections or identification of Primary Structural Elements which would require detailed inspections and inspection methods such as ultrasonic, eddy current, x-ray, etc. as required.



**APPENDIX 6. EXAMPLE STC CHECK SHEET (1 page)**

**EXAMPLE  
STC CHECK SHEET**

\_\_\_\_\_ Application from STC/Amendment or Drawing List approval (dated \_\_\_\_\_ ).  
 \_\_\_\_\_ Application Form 8110-12  
 \_\_\_\_\_ Certification Plan  
 \_\_\_\_\_ FAA letter of acknowledgment transmitted. #: \_\_\_\_\_ date: \_\_\_\_\_  
 \_\_\_\_\_ Compliance Checklist  
 \_\_\_\_\_ Drawing review:  
 \_\_\_\_\_ Completed/DER Approved. D/L: \_\_\_\_\_ Rev: \_\_\_\_\_ Date: \_\_\_\_\_  
 \_\_\_\_\_ Document List #: \_\_\_\_\_ Rev.: \_\_\_\_\_ Date: \_\_\_\_\_  
 \_\_\_\_\_ Report review: Completed /DER Approved. Report: \_\_\_\_\_ Rev: \_\_\_\_\_  
 \_\_\_\_\_ Reports Submitted: \_\_\_\_\_  
 \_\_\_\_\_ test plan/report acceptable. Number: \_\_\_\_\_ Rev: \_\_\_\_\_  
 \_\_\_\_\_ systems data reviewed and accepted by: \_\_\_\_\_  
 \_\_\_\_\_ data reviewed and accepted by: \_\_\_\_\_  
 \_\_\_\_\_ substantiation acceptable. Report: \_\_\_\_\_ Rev. \_\_\_\_\_  
 \_\_\_\_\_ test plan/report acceptable. Number: \_\_\_\_\_ Rev: \_\_\_\_\_  
 \_\_\_\_\_ substantiation acceptable. Report: \_\_\_\_\_ Rev. \_\_\_\_\_  
 \_\_\_\_\_ test plan/report acceptable. Number: \_\_\_\_\_ Rev: \_\_\_\_\_  
 \_\_\_\_\_ Weight and Balance supplement acceptable.  
 \_\_\_\_\_ Flight manual supplement reviewed and accepted by Flight Test Branch.  
 \_\_\_\_\_ TIA (if applicable) approved/transmitted.  
 \_\_\_\_\_ Flight test report complete and acceptable.  
 \_\_\_\_\_ DER Statement of Compliance Form(s) 8110-3 received.  
 \_\_\_\_\_ Instructions for Continued Airworthiness reviewed and accepted by AEG.  
 \_\_\_\_\_ Part conformity inspection requested. D/L: \_\_\_\_\_ Rev: \_\_\_\_\_  
 \_\_\_\_\_ Part conformity inspection acceptable.  
 \_\_\_\_\_ Installation conformity inspection requested. D/L: \_\_\_\_\_ Rev: \_\_\_\_\_  
 \_\_\_\_\_ Installation conformity inspection acceptable.  
 \_\_\_\_\_ STIR complete.  
 \_\_\_\_\_ Other requirement(s): \_\_\_\_\_  
 \_\_\_\_\_ STC/Drawing List approval:  
 \_\_\_\_\_ Signed: \_\_\_\_\_ STC #: \_\_\_\_\_ Date: \_\_\_\_\_  
 \_\_\_\_\_ Conformity Inspection Record(s) Form 8110-1 Received: \_\_\_\_\_  
 \_\_\_\_\_ Project closed out: (date \_\_\_\_\_ ).  
 \_\_\_\_\_ Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**APPENDIX 7. LIST OF FAA FORMS (1 page)**

1. FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance).
2. FAA Form 8000-4, Air Agency Certificate
3. FAA Form 8000-5, Certificate of Designation
4. FAA Form 8100-1, Conformity Inspection Report
5. FAA Form 8110-1, Type Inspection Authorization
6. FAA Form 8110-2, Supplemental Type Certificate
7. FAA Form 8110-2-1, Type Certification Continuation Sheet
8. FAA Form 8110-3, Statement of Compliance with the Federal Aviation Regulations
9. FAA Form 8110-4, Type Inspection Report - Part I: Rotorcraft Ground Inspection
10. FAA Form 8110-5, Type Inspection Report - Part I: Airplane Ground Inspection
11. FAA Form 8110-6, Type Inspection Report - Engines
12. FAA Form 8110-7, Type Inspection Report - Propellers
13. FAA Form 8110-8, Type Inspection Report - Part I: Free Balloons
14. FAA Form 8110-9, Type Certificate
15. FAA Form 8110-12, Application for Supplemental, Production or Type Certificate
16. FAA Form 8110-13, Type Certification Project Status
17. FAA Form 8110-14, Statement of Qualifications (DMIR - DER - DPRE - DME)
18. FAA Form 8110-20, Rotorcraft Ground Inspection
19. FAA Form 8110-21, Airplane Ground Inspection
20. FAA Form 8110-26, Supplemental Type Inspection Report
21. FAA Form 8120-10, Request for Conformity
22. FAA Form 8130-3, Airworthiness Approval Tag
23. FAA Form 8130-9, Statement of Conformity
24. FAA Form 8430-9, Certification of Authority





- |     |  |                 |
|-----|--|-----------------|
| 10. | <b>Los Angeles Aircraft Certification Office</b><br>3960 Paramount Blvd.<br>Lakewood, California 90712                     | <b>ANM-100L</b> |
| 11. | <b>Airplane Certification Office</b><br>2601 Meacham Boulevard<br>Fort Worth, Texas 76137-4298                             | <b>ASW-150</b>  |
| 12. | <b>Rotorcraft Certification Office</b><br>2601 Meacham Boulevard<br>Fort Worth, Texas 76137-4298                           | <b>ASW-170</b>  |
| 13. | <b>Special Certification Office</b><br>2601 Meacham Boulevard<br>Fort Worth, Texas 76137-4298                              | <b>ASW-190</b>  |
| 14. | <b>Brussels Aircraft Certification Division</b><br>15 rue de la Loi (1 <sup>st</sup> floor)<br>B-1040<br>Brussels, Belgium | <b>AEU-100</b>  |

**APPENDIX 9. LIST OF ACRONYMS (2 pages)**

**AC:** Advisory Circular

**ACO:** Aircraft Certification Office

**AEG:** Aircraft Evaluation Group

**AFM/RFM:** Airplane/Rotorcraft Flight Manual

**AFMS/RFMS:** Airplane/Rotorcraft Flight Manual Supplement

**Agent:** An individual authorized by the applicant to act on the behalf of the applicant.

**Applicable Regulations:** Those portions of 14 CFR or CAR which apply to the STC modification (also called certification basis).

**Authorized Designee:** An FAA designee who has been granted approval by the FAA to perform a specific task for the applicant, such as witnessing a certain test or conducting a certain conformity inspection.

**CAM:** Civil Aeronautics Manual

**CAR:** Civil Air Regulations

**Certification Basis:** (See “Applicable Regulations.”)

**Certification Plan:** A written plan for the coordination of the STC application process, including identification of all applicable regulations and anticipated methods for demonstrating compliance with the regulations, proposed use of designees, and anticipated project schedule (also called Certification Program Plan).

**Certification Program Plan:** (See “Certification Plan.”)

**Certification Testing:** (See “Component testing.”)

**CG:** Center of Gravity

**Compliance Data:** Those data necessary to substantiate that the modification or installation complies with the applicable regulations (also called Substantiating data).

**Compliance Inspection:** Specification review and physical inspection of hardware to verify that a particular component or modification complies with the requirements of the applicable regulations.

**Component Testing:** Testing of a detail part, component, or subassembly to demonstrate that it functions as required to meet the applicable regulations (also called certification testing).

**Conformity Inspection:** A physical comparison of the component or modification to the engineering drawings and specifications to verify that component or modification conforms to the data.

**DAR:** Designated Airworthiness Representative

**DER:** Designated Engineering Representative

**Descriptive Data:** Data necessary to completely define the design of the modification or installation.

**Designee:** Individuals authorized by the FAA to approve data, conduct inspections, witness tests, etc.

**DMIR:** Designated Manufacturing Inspection Representative

**Experimental Airworthiness Certificate:** As referenced in this guide, a certificate to operate the aircraft with the modification installed before STC approval is granted in order to perform research and development testing and FAA flight testing.

**FAA:** Federal Aviation Administration

**Field Approval:** Approval of a major or minor change by a flight standards inspector by an approved/completed FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance).

**Flight Testing:** Testing in flight of the final modification or installation on the aircraft.

**14 CFR:** Title 14 of the Code of Federal Regulations

**FSDO:** Flight Standards District Office

**Ground Testing:** Structural, environmental, fuel flow, or similar tests (other than flight tests) which are performed on the final modification to, or installation on, the aircraft to demonstrate that it complies with the applicable regulations.

**Major Change:** A change to an aircraft, engine, or propeller which appreciably affects weight, balance, strength, reliability, operational characteristics, airworthiness characteristics, power and noise characteristics, or emissions.

**MDL:** Master Drawing List

**MIDO:** Manufacturing Inspection District Office

**Minor Change:** A change to an aircraft, engine, or propeller which does not appreciably affect weight, balance, strength, reliability, operational characteristics, airworthiness characteristics, power and noise characteristics, or emissions.

**MISO:** Manufacturing Inspection Satellite Office

**MMEL:** Master Minimum Equipment List

**Multiple STC:** An STC applicable to more than one serial number aircraft, engine, or propeller.

**NTIS:** National Technical Information Service

**“One-only” STC:** An STC applicable to only one serial number aircraft, engine, or propeller.

**PMA:** Parts Manufacturer Approval

**POH:** Pilot Operating Handbook

**Project Engineer:** The FAA ACO engineer assigned to the STC application to evaluate the data submittals.

**Project Manager:** The FAA ACO engineer or supervisor assigned to coordinate the approval process of an STC application.

**Project Number:** The number assigned by the FAA ACO to the STC application to facilitate the approval process.

**Project Team:** The FAA personnel assigned to the STC project.

**Request for Conformity:** A request from the FAA project engineer to the FAA manufacturing aviation safety inspector to perform a conformity inspection on a specific article.

**Statement of Conformity:** Official signed statement from the applicant signifying that the modification or installation conforms to the design data and to the type design. (FAA Form 8130-9.)

**STC:** The Supplemental Type Certificate is issued for major design changes to type certificated products when the change is not so extensive as to require a new Type Certificate.

**STC Application:** Application for Type Certificate, Production Certificate, or Supplemental Type Certificate. (FAA Form 8110-12.)

**Substantiating Data:** (See “Compliance data.”)

**STIR:** The Supplemental Type Certification Report is an official document that provides a means for the manufacturing inspector to record the results of inspections and tests conducted on modified products presented for STC's (FAA Form 8110-1).

**TC:** Type Certificate

**TCAS:** Traffic Collision (Alert) and Avoidance System

**TCDS:** The Type Certificate Data Sheet is a part of the TC which documents the conditions and limitations necessary to meet the airworthiness requirements of Title 14 of the Code of Federal Regulations, and provides a concise definition of the configuration of a type-certificated product.

**Test Article:** Components used specifically for certification testing.

**TIA:** The Type Inspection Authorization is an official document that lists the inspection and flight testing requirements for the modification that initiates official FAA flight testing (FAA Form 8110-1).

**TIR:** The Type Inspection Report is an official document utilized in conjunction with the TIA that provides a means for the manufacturing inspector to report the results of the ground inspection, (part one of the TIA).

**TSO:** The Technical Standard Order is a minimum performance standard issued by the Administrator for specified materials, parts, processed, or appliances used on civil aircraft.